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Featuring This Month

ENTER: The High-Tech World of Computers

Plus Our Regular Departments

Cover Photo: Animals Animals/H. Ausloos
© Press & Pictures

World Under Glass

Earth is a biosphere—a self-contained system where living things grow and change and interact with each other. So far, it's the only one humans know of.

That will change in 1989, when scientists plan to seal the doors of Biosphere II—a self-contained two-acre world under glass in the Arizona desert.

Inside the Biosphere will be nine different mini-environments: a rainforest, a grassy plain, fresh- and salt-water marshes, a shallow lagoon, a deep ocean, a coral reef, a scrub forest and a desert.

There will be a small farm inside. There will be fish, birds, insects and animals. And, for two years, eight human beings will live in Biosphere II, too.

Biosphere II's planners say the project will help people to understand the connections between living things on Earth. But it isn't just an experiment. One day, Earthlings on the moon or Mars may live in bases like the one being built in Arizona.

ILLUSTRATION BY FANNY MELLET BERRY

Slower Sound

Scientists make mistakes sometimes, like anyone else. Dr. George Wong, a researcher in Canada, recently discovered a doozy. It turns out that sound moves about half a mile per hour more slowly than scientists thought. It moves 741.1 miles per hour, not 741.5.

How did the mistake happen? Way back when, someone figuring the speed of sound made a guess that was close, but not close enough.

PHOTO BY NALIRICE KOONCE, RAY MANLEY PHOTOGRAPHY

Sticky and Wet

Who are the strongest creatures in the sea? Mussels, of course! Okay, it's a bad joke, but the shellfish may really help solve an old and sticky problem—how to make glue that stays strong even when wet.

If you've ever worn a bandage in the tub, you know that water weakens glue. But mussels stay stuck in the wettest world of all—the sea. The special glue they squirt out of their feet sticks and hardens underwater.

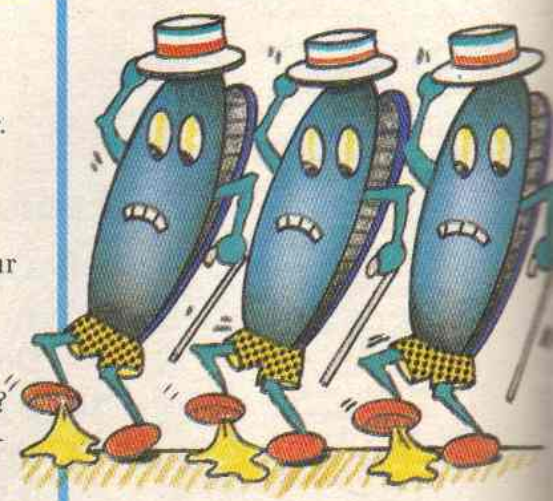


ILLUSTRATION BY CAMERON EAGLE

There's just one problem: It takes 3,000 mussels to produce one gram of glue. If humans want to use mussel-style glue, they'll have to make it themselves.

That's why Dr. Herbert Waite, a biochemist at the University of Connecticut, spent 12 years studying mussel glue. Dr. Waite cracked the chemical code. Now scientists can make superglue.

Dentists may use the glue to fix broken teeth. Surgeons may squeeze it on like a bandage to cover stitches inside peoples' bodies. Boat builders may use it to seal the bottoms of ships. With superglue, people will finally be as strong as mussels.

A Good Tip

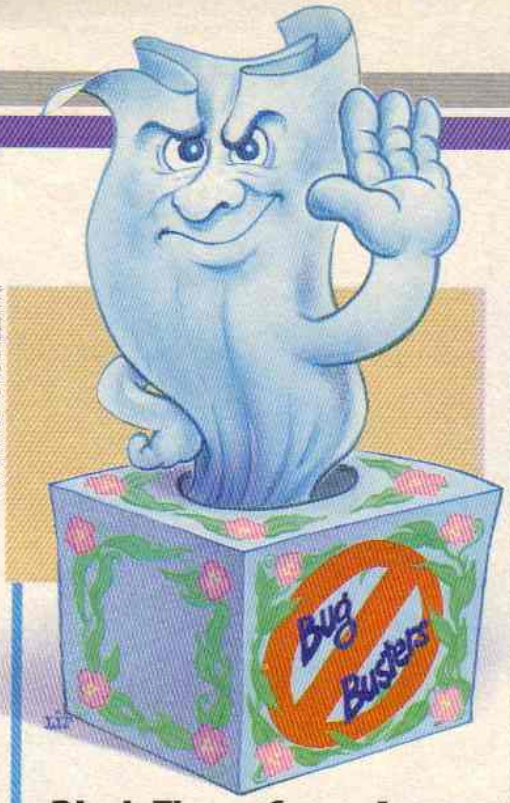
Some robots can "see" with video cameras, and some can even "taste." But robot experts have had trouble building robots that touch and know what they're touching. Two University of Florida scientists, Dr. Gale Nevill and Dr. Robert Patterson may have the answer at their fingertips.

Everybody has tiny ridges on their fingertips. When you rub your fingertips across an object, the ridges vibrate and send messages to your brain. The messages help you to know what you're touching.

So Dr. Nevill and Dr. Patterson decided to put ridges on robots' fingertips. The rubber ridges send their messages to the robot's "brain"—a computer. (Computer experts are developing software to make sense of the messages.) The result: robots that "feel better" than ever.

ILLUSTRATION BY JOLYNN ALCORN

ILLUSTRATION BY RON LIPKING



Block Those Germs!

Someday soon, when you blow your nose, you won't just be clearing your head—you'll be making the world a healthier place. That is, if you use a new tissue invented by Kimberly-Clark, the makers of Kleenex.

Most tissues have two layers of paper. This one has three. The middle layer is saturated with virus-killing chemicals.

"It won't cure your cold," says Ron Goodrow of Kimberly-Clark. "But each time you sneeze into it, the viruses that caused the cold would be killed."

That's how the new tissues can help keep colds from spreading. There's only one problem: They cost three times as much as regular tissues. That's more than most folks are willing to pay.

Paint Invaders

Satellites aren't in danger of alien attack. But floating space particles can dig microscopic pits in the satellites' sides, damaging sensitive instruments.

The particles come from meteors—and neighboring satellites! Scientists have found that tiny bits of paint flake off spacecraft and crash-land, digging the tiny, pesky craters.

So What's New?

You tell us and you'll get a nifty CONTACT T-shirt—if we print your story. Send us any science stories from the news that have to do with the future. (Be sure to tell us where you heard the story.)

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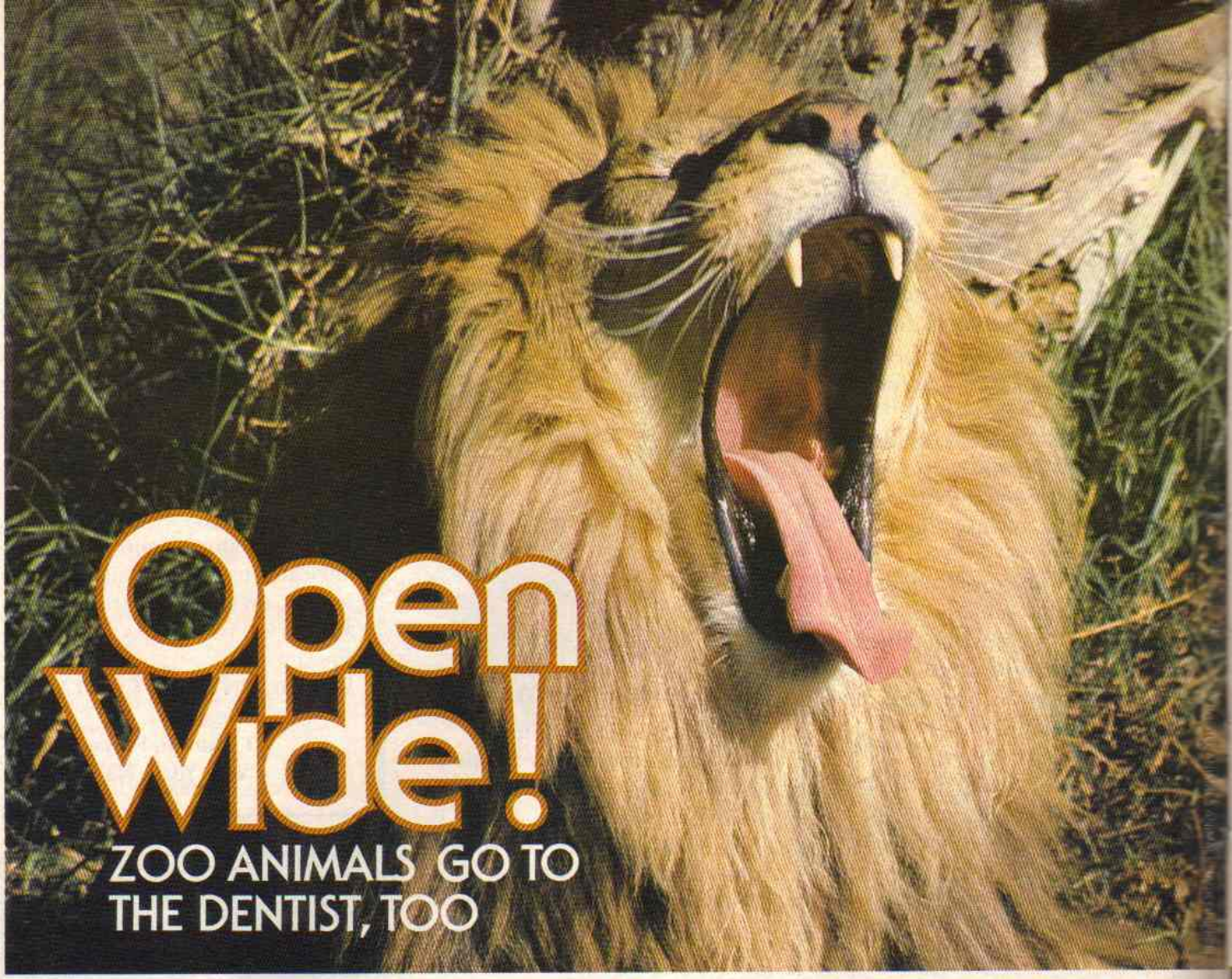


Open Wide!

ZOO ANIMALS GO TO THE DENTIST, TOO

by Russell Miller

Everybody loves zoos. Some folks like to look at llamas. Some giggle at gorillas. Some eye elephants and some watch walruses. But when Dr. Norm Reddick visits the zoo, he likes to put his hands in the mouths of lions.

Don't worry—the lions are fast asleep. And Dr. Reddick knows what he's doing. He's a dentist from Westlake Village, California. Usually, he works on human mouths. But in his free time he goes to the Los Angeles Zoo to care for the animals' teeth.

Dr. Reddick isn't alone. All across the U.S., dentists are cleaning and fixing the teeth, the tusks and even the beaks of zoo animals. They know that teeth can be an animal's best friend.

Take a tiger for example. It's one of the hungriest, meanest cats in the jungle—until it breaks a fang. Then, all of a sudden, it can't catch, it can't grab, it can't hold its prey. If a tiger can't eat, it may become someone else's dinner.

Tigers—and grizzly bears and rhinos and gnus—are safer at the zoo than in the wild. But they still need healthy mouths. Diseases can start in the teeth or gums and spread throughout an animal's body.

All Sorts of Problems

All kinds of animals have tooth troubles. In a single afternoon at the Minnesota Zoo, Dr. Dwight Buller might operate on an otter, a couple of wolverines and a Siberian tiger. He'll top things off by examining an orangutan.

One common problem is tartar—hard, crusty crud that builds up naturally on teeth. Tartar can cause gum disease. Animals in the wild chew bones and other rough stuff that scrape teeth clean. Zoo animals get softer food, so dentists do the scraping—just as they do with humans.

Some animals—from antelopes to woodchucks—have teeth that never stop growing. Usually, their top and bottom teeth grind each other down. If they don't, they can cut holes into

Right: It's check-up time for this gibbon. Dr. Sherri Huntress takes a good look.

PHOTO COURTESY DR. SHERRI HUNTRESS

Below: Sticks and bones won't hurt this cougar. Chewing helps keep an animal's teeth clean in the wild.

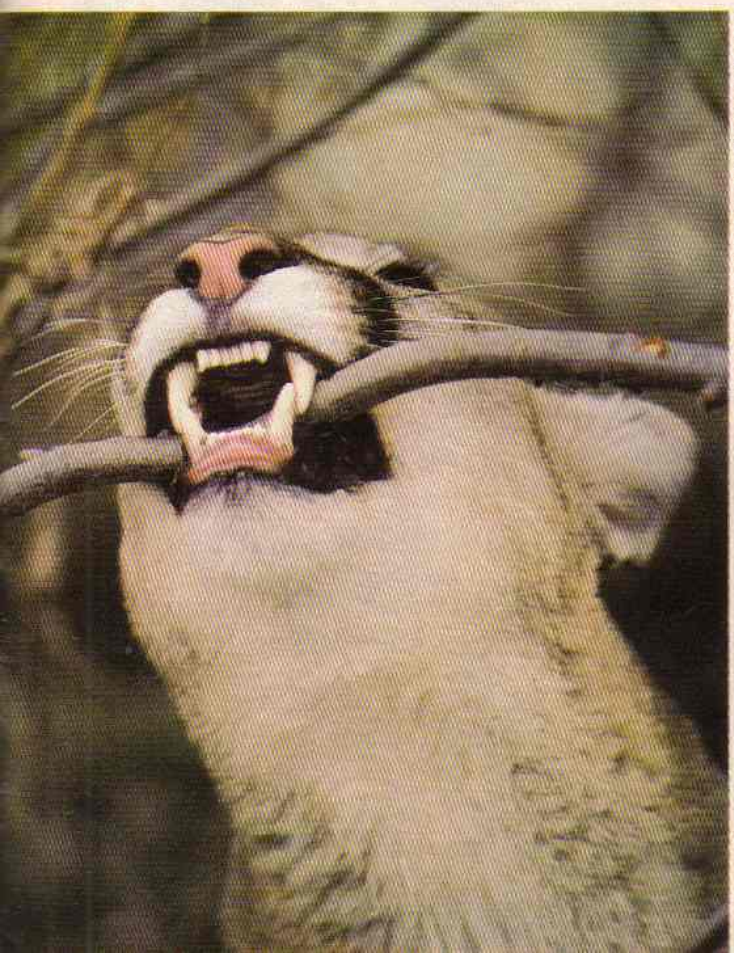


PHOTO: ANIMALS ANIMALS © ED WOLFF

the animal's lip or chin. In zoos, dentists cut down ever-growing teeth.

When an animal's baby teeth don't fall out, dentists have to pull them. (That's a big problem for elephants—they grow six separate sets of teeth between birth and age 60!)

Animals rarely get cavities, so zoo dentists hardly ever make fillings. But Dr. Carl Tinkelman once made a set of braces for a bucktoothed woodchuck in the Philadelphia Zoo. (They didn't work, so Dr. Tinkelman filed the woodchuck's teeth to keep it from biting itself.)

Bad Breaks

Then there are plain old broken teeth. In the wild, animals break teeth playing, fighting, or even falling out of trees. Zoo life can be just as tough on teeth. Dr. Andrew Bronny, who helps out at the Brookfield (Illinois) Zoo, once treated a polar bear who cracked a tooth on a barrel in his wading pool. Dr. John Scheels, who works with the Milwaukee County Zoo in Wisconsin, pulled several broken teeth from a baby gorilla who fell while learning to climb.

"On the forest floor, out in the jungle, it might have been a softer landing," Dr. Scheels said. "In the cage, she injured herself. After that, we put mats in to cushion the fall."

Animals new to a zoo sometimes end up with broken teeth, too. "Monkeys come in from the ➡

wild," says Dr. Bronny, "and they're the new kids on the block. They get picked on and they have to prove themselves. So they get in fights." The fights can end in tooth trouble.

Zoo animals get all their nutrition in a small amount of food, but some may still feel hungry. If they're used to spending their days searching for food, they look for something to do. That can mean chewing on rocks or biting the bars of their cages—and breaking teeth.

Painful Secrets

It takes a clever detective to find problems in a zoo animal's mouth. Animals with tooth problems sense they're weak, and they try to keep their weakness a secret.

"Animals are pretty good about hiding things," says Dr. Sherri Huntress, the veterinarian at the Gladys Porter Zoo in Brownsville, Texas. "They might have a bad infected tooth in their mouth and you'd never know it until you look inside." Some fight pain their own way. An elephant will stuff a broken tusk with dirt.

Teamwork helps. Dentists work closely with vets like Dr. Huntress and with zookeepers who watch over animals' all-over health. Everyone keeps an eye out for trouble signs such as poor eating, weight loss, broken whiskers, drooling, or—believe it or not —bad breath!

Often, vets notice tooth trouble while they're treating animals for other problems. That's how Dr. Bert Paluch, the veterinarian at Six Flags Great Adventure Safari Park, in Jackson, NJ, found that Harriet, a 12-year-old leopard, had a fractured fang.

Dr. Paluch called Dr. Ed Shagam, a local dentist. They decided not to pull the broken tooth. Removing a tooth can weaken an animal's jaw and change the shape of its face. The patient ends up looking weak. That may encourage another animal to attack.

Dr. Shagam and Dr. Paluch decided Harriet needed a *root canal* operation. They would dig all the sick nerve material out of the inside of Harriet's tooth. Then they'd fill the tooth with a kind of cement, leaving it in place.

To The Rescue

Harriet was still in her cage when a tranquilizer dart caused her to fall asleep. A zebra-striped pick-up truck brought her to the animal hospital. There, Dr. Paluch had her breathe a mix of gases that kept her sleeping soundly.

The leopard lay still, breathing quietly. Her paws hung over the edge of the operating table. Dr. Shagam worked quickly, taking X-ray pictures of the broken tooth on a film big enough to photograph a human's whole mouth. He studied the X-rays, then set to work cleaning and filling.

Harriet woke up less than three hours later with her fang fixed. A human patient might have visited the dentist four times for the same operation. Zoo dentists work fast because keeping wild animals asleep is tricky work. Vets only do it when there's no choice, and they get animals up and about as soon as possible.

Speed is one difference between zoo dentistry and people dentistry. There's also the size of the teeth. With humans, it's one size only. In zoos, dentists move from an elephant's tusk to the teeth of a tenrec—a sort of two-inch-long hedge-

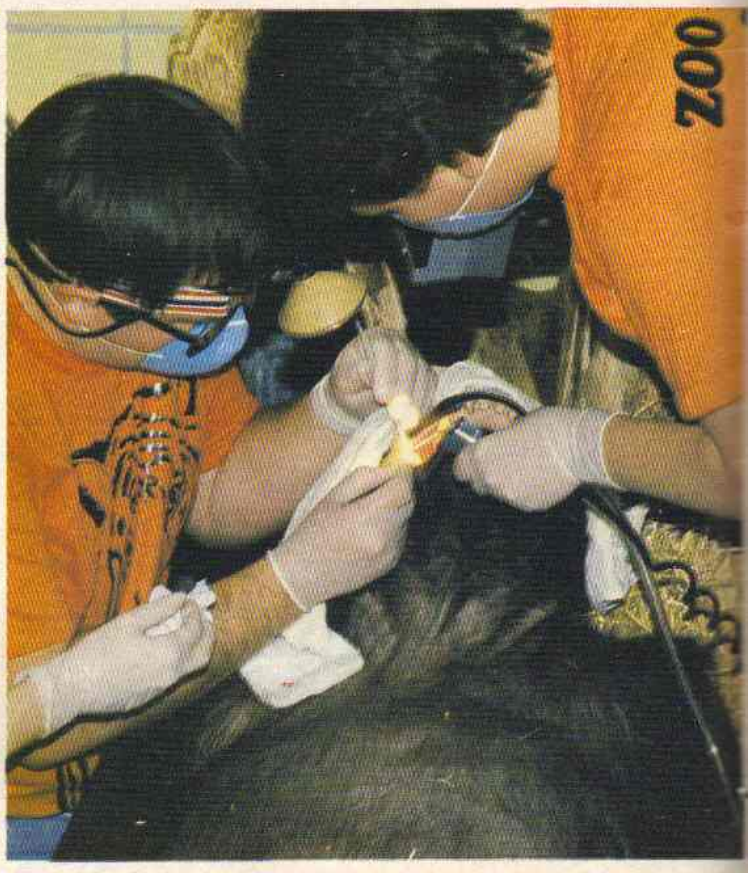


PHOTO COURTESY OF DR. JOHN SCHEELS

Dr. John Scheels (left) and a helper work to ease a gorilla's toothache. The white cloth keeps bright light out of the patient's eyes.

PHOTO COURTESY DR. R. ERIC MILLER

It took quite a team to pull this elephant's tooth at the Brookfield Zoo.

hog. It's tough to find tools that are the right size for the job. Zoo dentists use everything from pipe cleaners to power drills.

It's exciting work. Dr. Dwight Buller told CONTACT how it feels to fiddle around in the mouth of a sleeping jaguar: "Just feeling this body, you realize this animal isn't made to look pretty. He's made to earn his keep.

"It's kind of like a truck going down the road at 60 miles an hour," Dr. Buller said. "We generally think of it as safe. But if you get too close, it's pretty dangerous. You have to take care."

Harriet Goes To The Dentist

1. Dr. Ed Shagam (left) and Dr. Bert Paluch get set to X-ray Harriet's broken fang. **2.** In the root canal operation, Dr. Shagam cleans out the inside of the fang, then refills it. **3.** Dr. Paluch makes sure Harriet's warm and safe for the ride home after the operation.

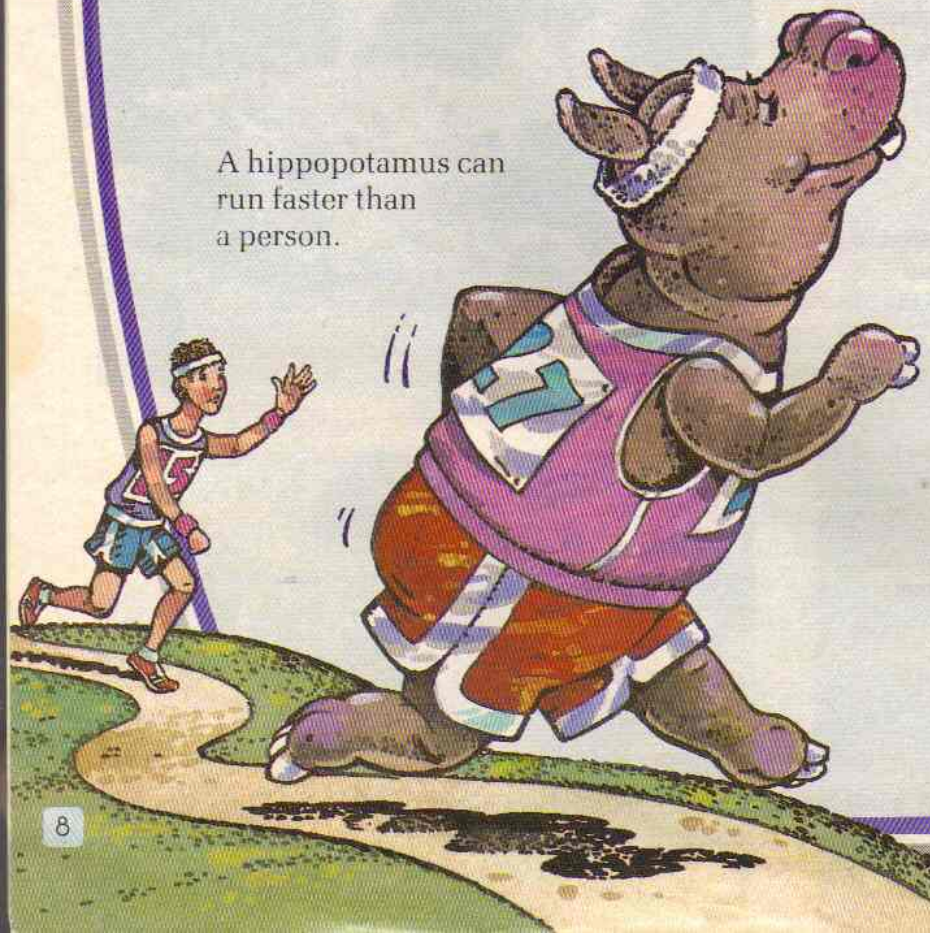
PHOTOS © RICHARD HUTCHINGS

Factoids

Bees have five eyes
and taste food
with their back feet.

The hardest substance
in the human body is not bone.
It's the enamel on teeth.

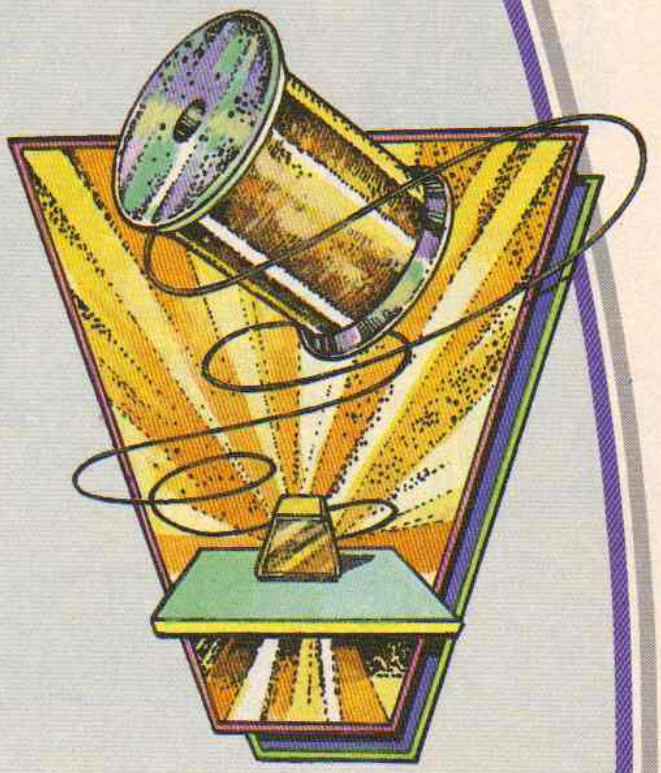
A hippopotamus can
run faster than
a person.



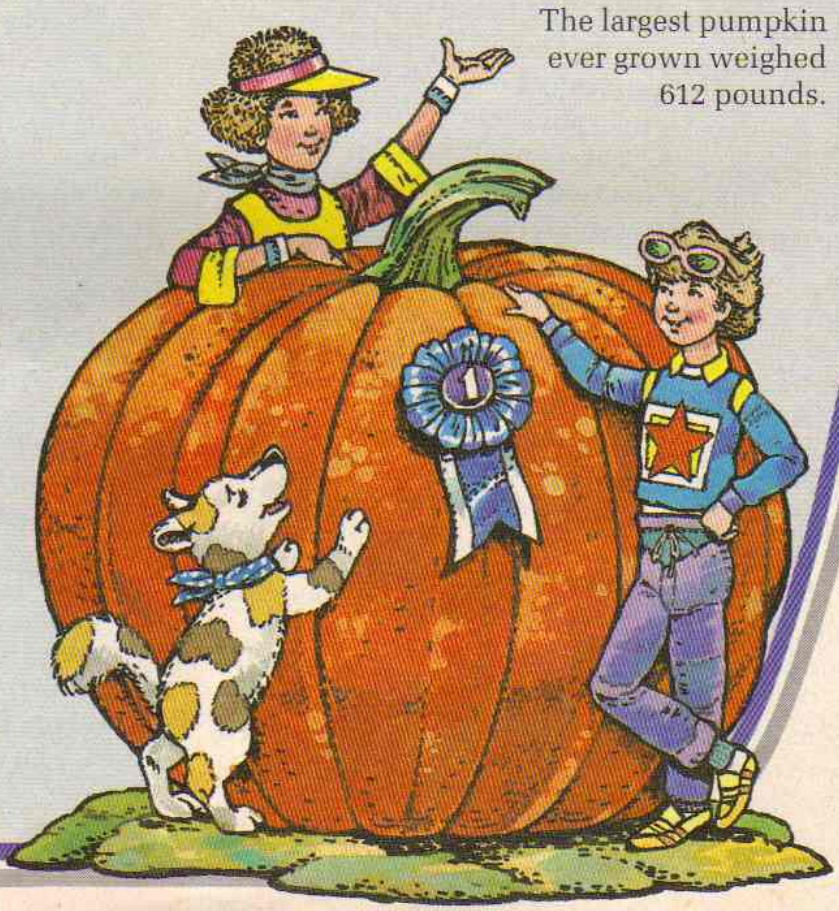
Last year, the average
American family of
four washed one ton
(2,000 pounds) of laundry.

A koala isn't a bear.
It's a marsupial—an animal that raises its young in a pouch.

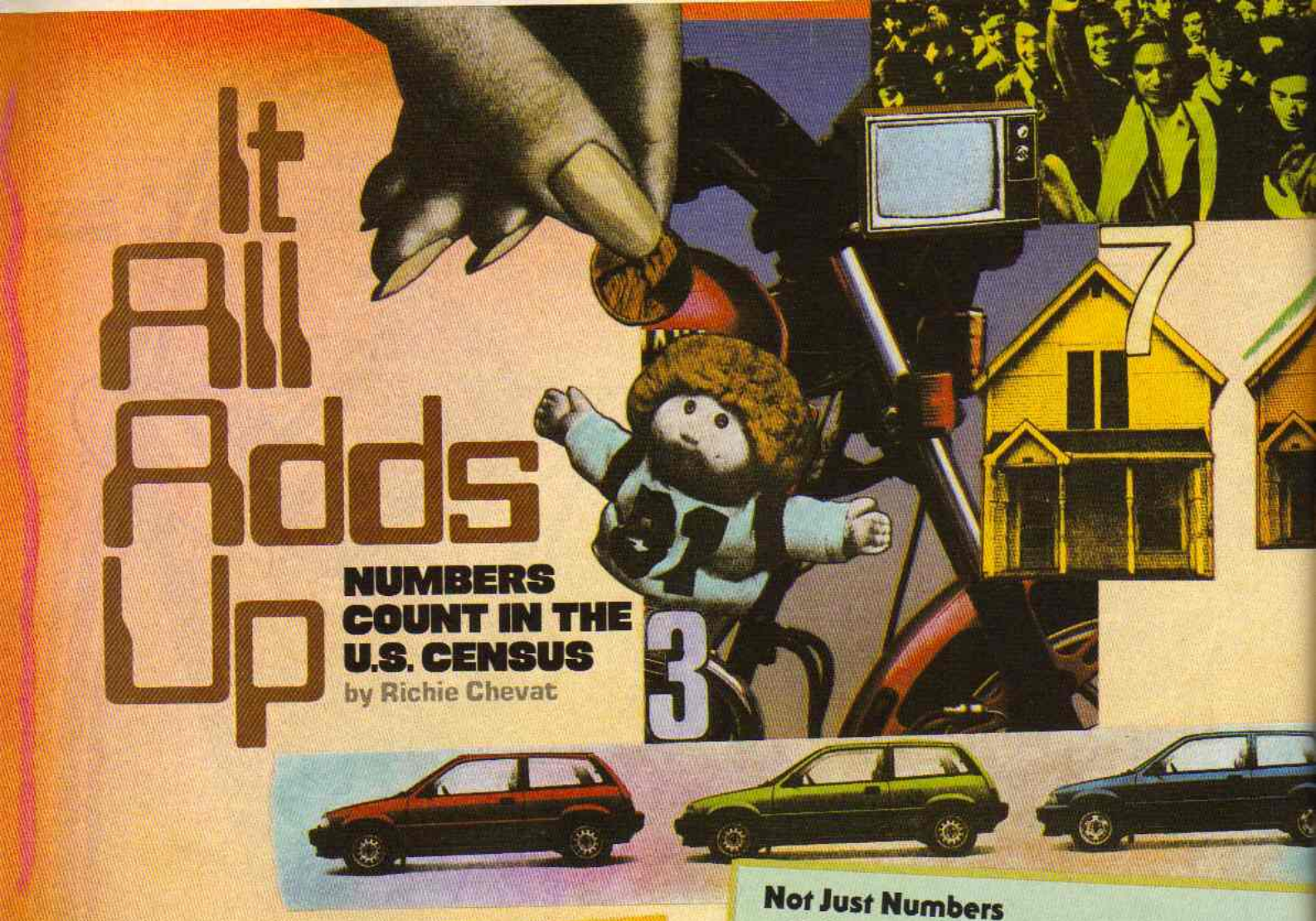
An ounce of gold can be stretched into a fine wire 50 miles long.



ILLUSTRATIONS BY JOHN NEZ



The largest pumpkin ever grown weighed 612 pounds.



It All Adds Up

NUMBERS COUNT IN THE U.S. CENSUS

by Richie Chevat

Which is the windiest city in the United States? Which city in the United States has the biggest range of temperatures? Which state has more motorcycles than any other?

The answers are: Cheyenne, Wyoming; Bismarck, North Dakota; and the state of Michigan—with 229,000 motorcycles.

Now here's another question for you: Where can you go to find out facts and figures on just about anything in the United States? The answer? The United States Bureau of the Census.

This agency was set up in 1790 to count the population of the U.S. Today, it does a lot more than that. Census workers figure out what kinds of people live in this country: whether they're old or young, rich or poor. And they also count things like the number of houses, bathrooms, televisions and just about anything else you can think of.

To do this job, the Census Bureau collects billions of pieces of information. What do they do with all those numbers? CONTACT took a trip to the Census Bureau's headquarters in Suitland, Maryland to find out.

Not Just Numbers

"A lot of people ask me, how can you stand to work with numbers all day?" says Cynthia Taeuber. "I tell them that these aren't just numbers—they're real people."

Cynthia is a *statistician* (stat-is-*TISH*-uhn). Her job is to take the numbers that the Census has collected and figure out what they mean. Right now she is working on a project that is studying the number of elderly people in the United States.

"In the years to come, a much higher percentage of the population will be over 65," Cynthia told CONTACT. "When people who are nine or 10 today grow up, it will be very common to have grandparents and great-grandparents who are living."

How can Cynthia be so sure about the future? Part of her job is to make predictions about what the population will be like 10, 20 or 30 years from now. But she doesn't just guess or look in a crystal ball. Instead, she makes projections based on the numbers that already exist. Projections are a kind of estimate of what will happen.

"We can't predict the future, but we can tell

you what will probably happen to groups of people," says Cynthia. "For example, we can tell you what will happen to the average girl who is 11 years old now. She will get married for the first time when she is 23 years old. She will have 1.6 marriages, will have no more than two children, and she will live to be 76 years old."

Making Numbers Count

Trying to predict what you'll be doing 20 years from now is fun, but Cynthia's projections are also useful. Everything from insurance rates to U.S. laws are based on reports from the Census Bureau.

Cynthia often meets with Senators and U.S. Representatives and their staffs to give them the latest facts and figures. This helps them plan laws and programs like Social Security. She also helps newspapers and magazines prepare their stories on the problems of the elderly.

"Problems can either be shown or hidden by the way you put numbers together," Cynthia told CONTACT. "For example, many people think of the elderly as one big group. But that's a mistake. There are lots of different kinds of people who are over the age of 65.

"For example, you can say that the elderly are earning more today than they did a few years ago. But if you break the elderly into different groups, you'll see that some people are not doing well at all. For example, three out of every four Black women over the age of 85 live in poverty."

No One Said I Couldn't

Most people might think that Cynthia is some kind of math whiz to be working with numbers. But she says that isn't so.

"A lot of people don't like math," she told CONTACT. "Especially girls. When I was in school I was just average in math. But I was lucky. Everybody told me to do it. No one said I couldn't.

"I also had a great example in my mother. When I was in fifth grade she went back to finish high school! Then she went on to college and today she works as a chemist."

If Cynthia hadn't taken the advice of teachers and relatives and studied math she wouldn't have the job she has today. Is she glad she did? You can count on it!

There's more to numbers than adding and subtracting. And now there's a great new show about numbers called Square One TV. To find out more, turn to page 28.

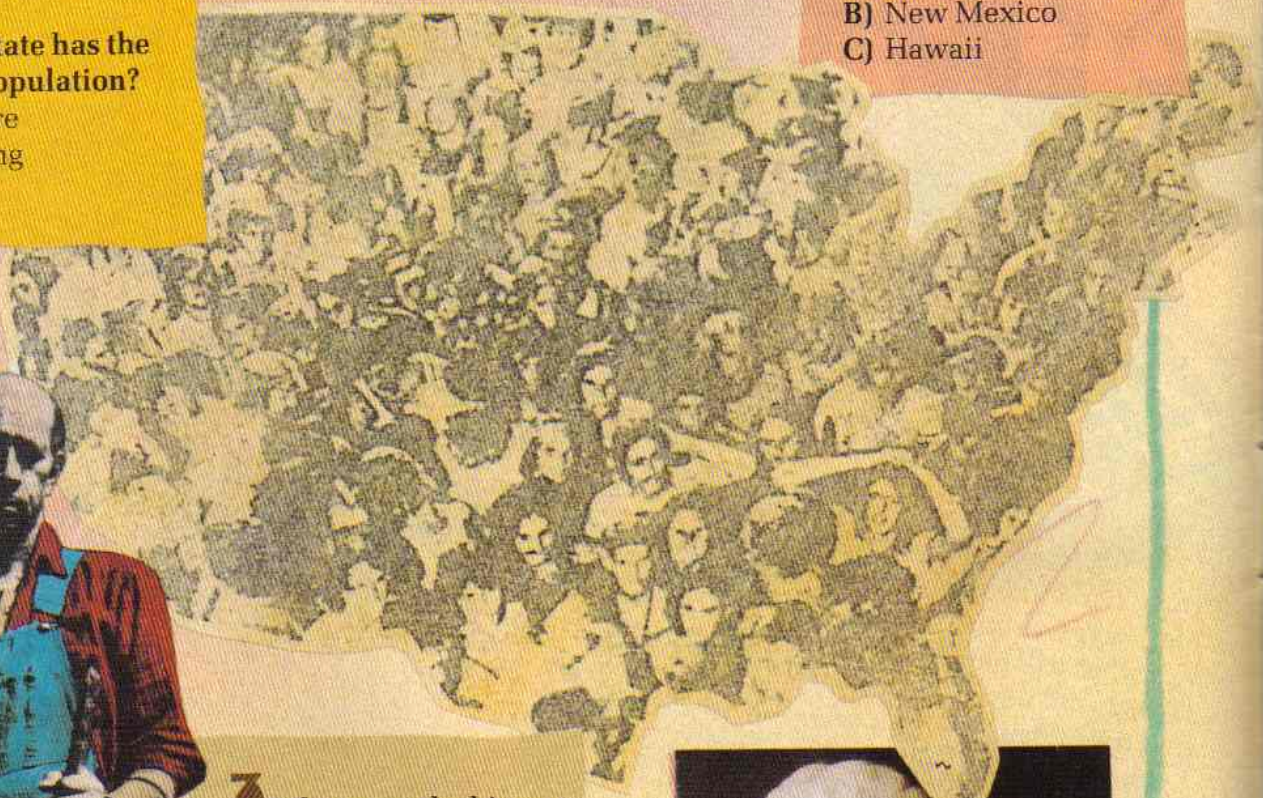
ILLUSTRATIONS BY CARL WESLEY

A Census Quiz

How good are you with numbers? Think you can guess the answers to our census quiz? We're counting on you to give it a try!

1 **The people of which state have the longest average life-span?**
A) Florida
B) New Mexico
C) Hawaii

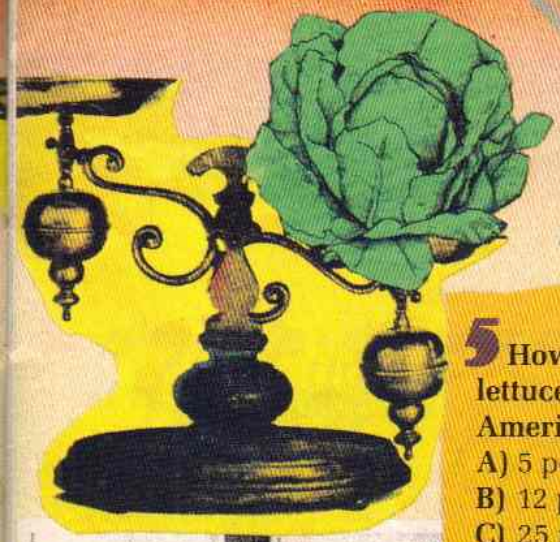
2 **Which state has the smallest population?**
A) Delaware
B) Wyoming
C) Alaska



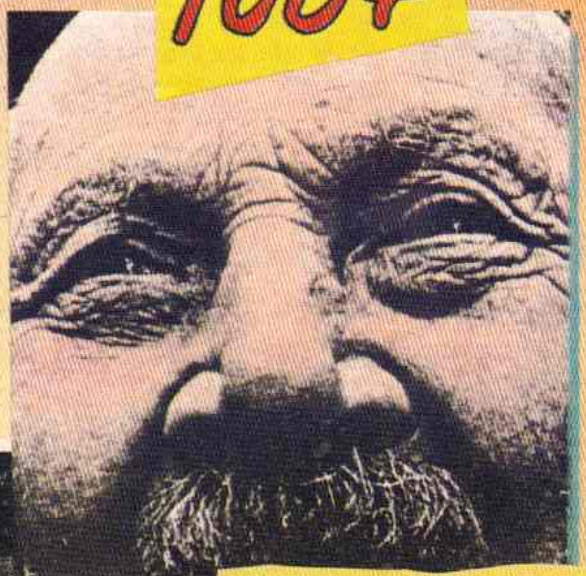
3 **Where are the biggest farms?**
A) Texas
B) Arizona
C) Kansas

4 **At the time of the first census, in 1790, about how many people were living in the U.S.?**
A) 1 million
B) 4 million
C) 10 million

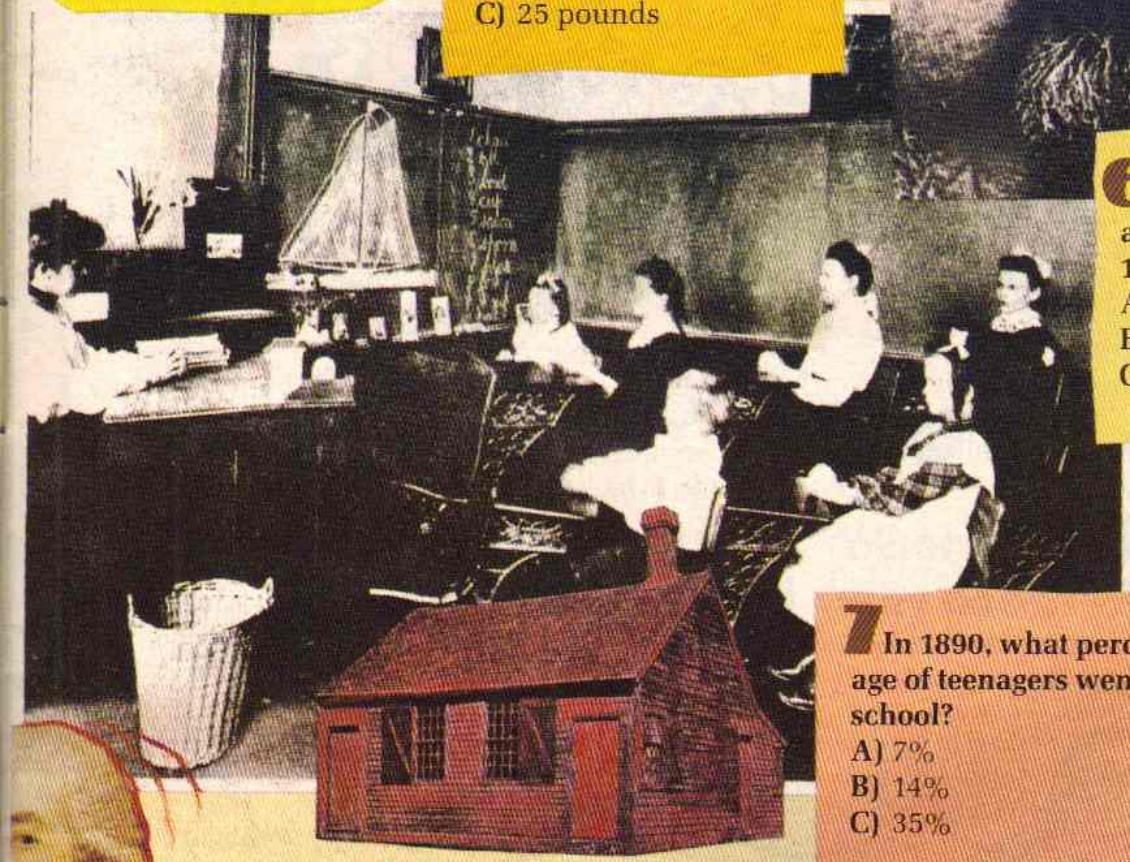
100+



5 How many pounds of lettuce does the average American eat each year?
A) 5 pounds
B) 12 pounds
C) 25 pounds



6 How many Americans are now over the age of 100?
A) 39,000
B) 57,000
C) 85,000



7 In 1890, what percentage of teenagers went to school?
A) 7%
B) 14%
C) 35%

ILLUSTRATIONS BY CARL WESLEY

8 If the population keeps growing the way it is now, which state will have the most people in the year 2000?
A) New York
B) California
C) Texas

Answers:
1. C 2. C 3. B 4. B 5. C 6. A 7. A 8. B

-WESLEY

Any Questions?

by Marilou Carlin

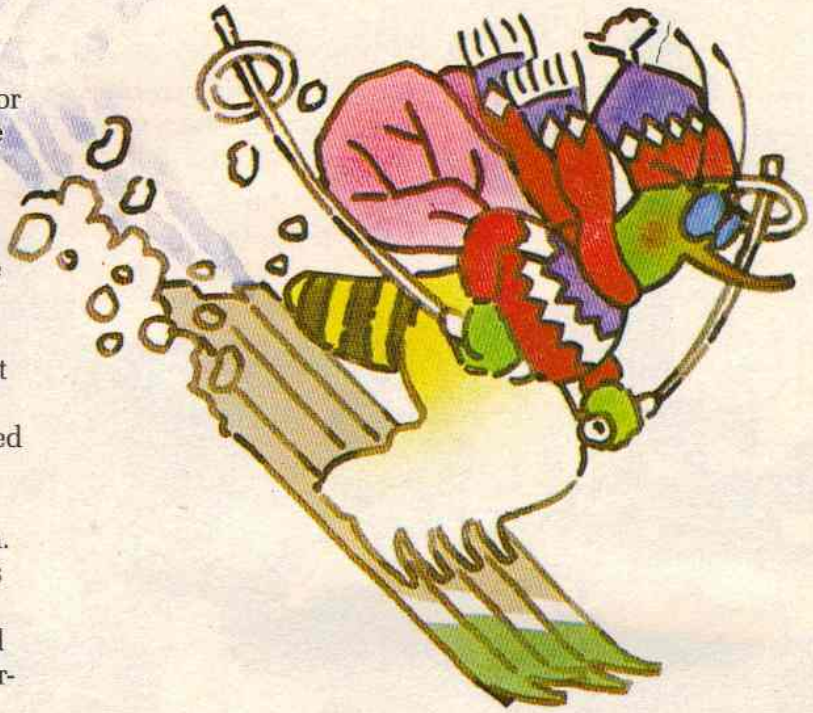
What do insects do in the winter?

Most insects use winter to get ready for new life in spring. Insects such as grasshoppers die when winter comes. But before they do, they lay their eggs. In spring, the eggs hatch and the baby grasshoppers come out to begin their short lives.

Other insects sleep through the cold season. The queen of a yellow jacket nest is a good example. When winter comes, she hides in a safe place. She hibernates until spring arrives. Then she comes out to start a new nest of yellow jackets.

Many bugs must spend part of their lives wrapped in cocoons. For some of them, winter is the perfect time to do this. Many maggots and caterpillars develop hard shells around their bodies in autumn. They spend the winter inside, where great changes take place. In the spring, they break out of their cocoons. What once was a maggot is now a fly. And the crawly caterpillar has become a beautiful butterfly or moth.

Question sent in by Jean Steiner, Brooklyn, NY.



Why is ocean and lake water blue?

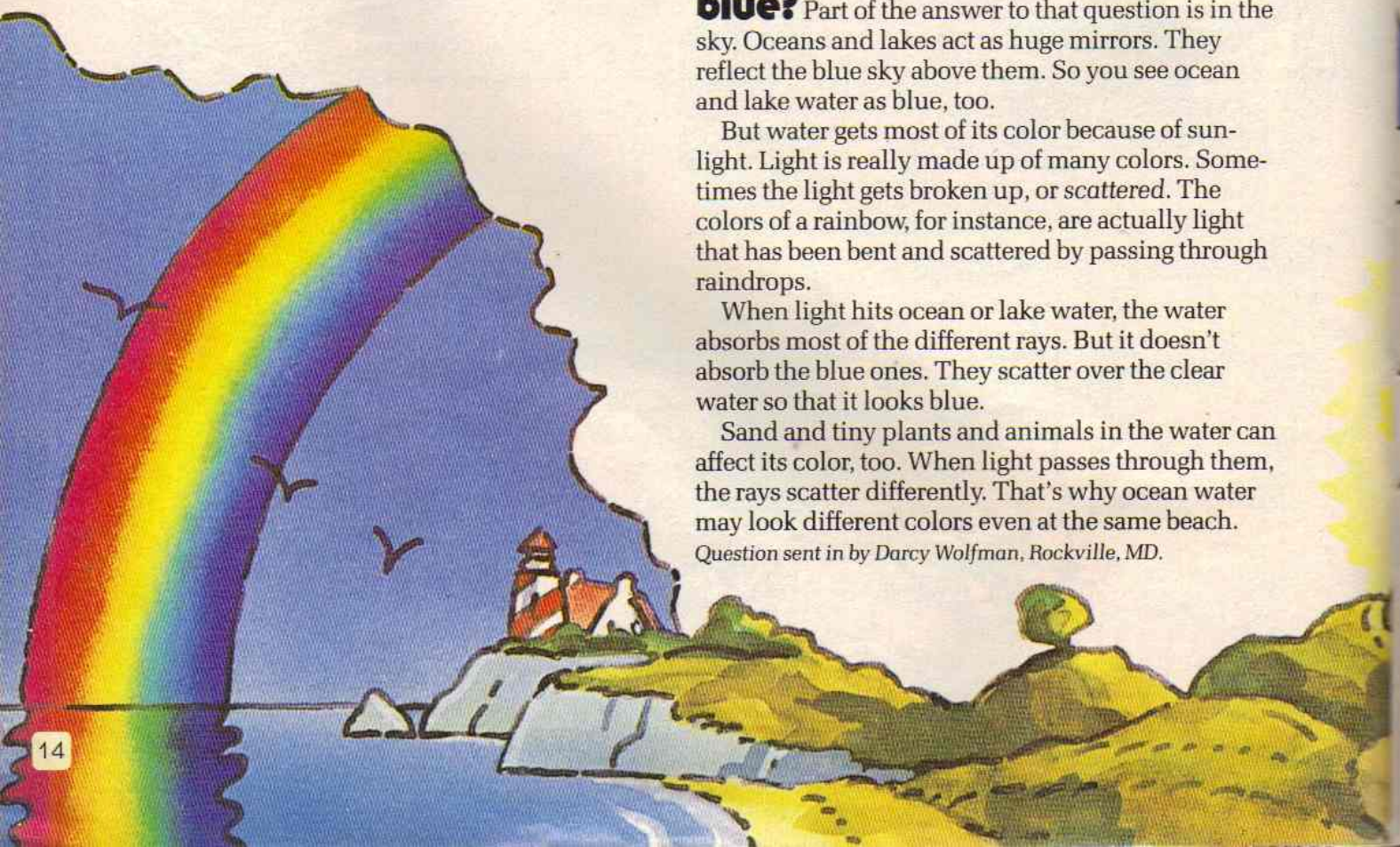
Part of the answer to that question is in the sky. Oceans and lakes act as huge mirrors. They reflect the blue sky above them. So you see ocean and lake water as blue, too.

But water gets most of its color because of sunlight. Light is really made up of many colors. Sometimes the light gets broken up, or *scattered*. The colors of a rainbow, for instance, are actually light that has been bent and scattered by passing through raindrops.

When light hits ocean or lake water, the water absorbs most of the different rays. But it doesn't absorb the blue ones. They scatter over the clear water so that it looks blue.

Sand and tiny plants and animals in the water can affect its color, too. When light passes through them, the rays scatter differently. That's why ocean water may look different colors even at the same beach.

Question sent in by Darcy Wolfman, Rockville, MD.



Do you have a question that no one seems able to answer? Why not ask us? Send your question, along with your name, address, and age, to:

Any Questions?
3-2-1 CONTACT
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Why does your nose run when it is cold outside?

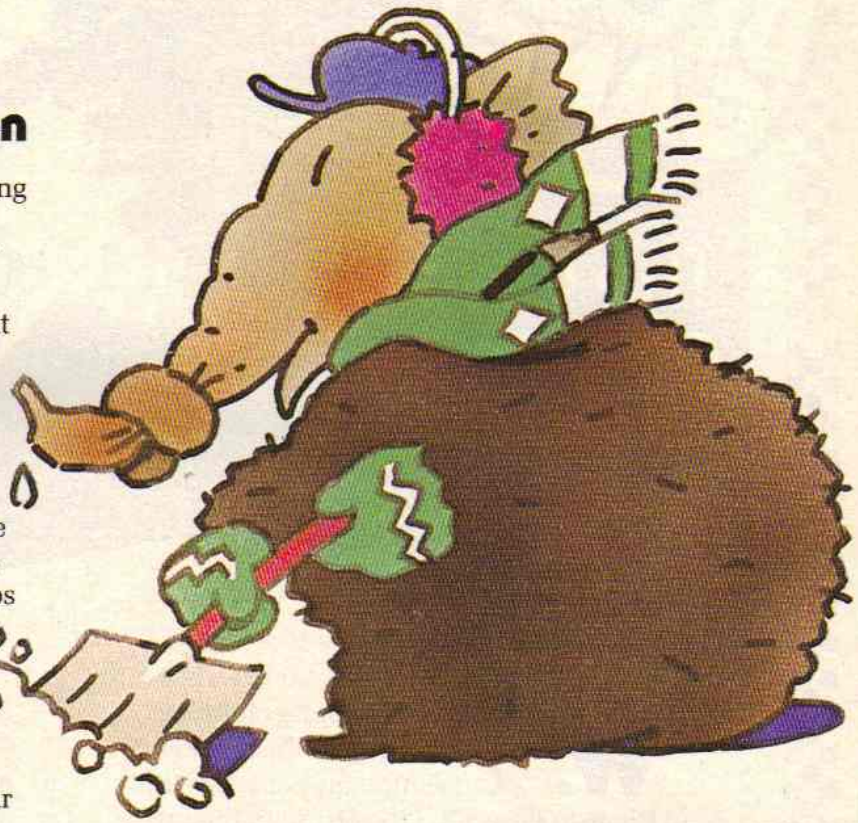
Suppose you're playing outside on a chilly November morning. You don't have a cold. So why does your nose keep running? A running nose is sometimes a sign of a cold or allergy. But in cold weather it can also be a sign that you're healthy.

Lining the inside of your nose is mucus. It's what comes out of your runny nose when you blow it. But you know that.

What you may not know is that mucus has two jobs. It catches dust and other tiny particles that are in the air. This stops dirt from reaching your lungs. Mucus also moistens the air you breathe. This helps to protect your throat and lungs.

The more dry, cold air there is, the more mucus you need. Your nose works overtime making lots of extra mucus so that your throat and lungs will stay comfortable longer. The extra mucus has nowhere to run but out of your nose. So it does!

Question sent in by Thomas Fowler, Trondheim, Norway.



What makes the sun burn and why doesn't it burn out?

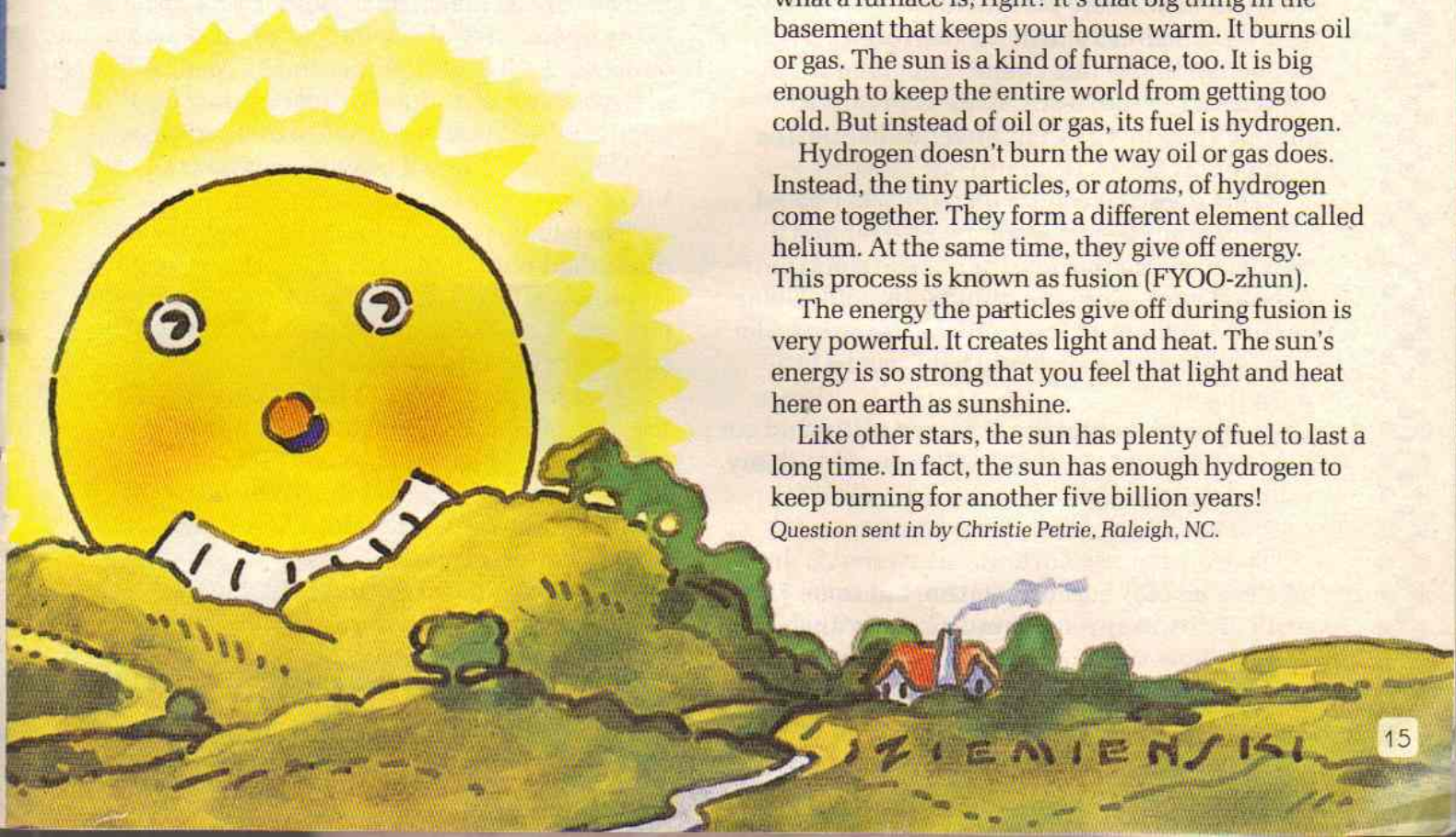
You know what a furnace is, right? It's that big thing in the basement that keeps your house warm. It burns oil or gas. The sun is a kind of furnace, too. It is big enough to keep the entire world from getting too cold. But instead of oil or gas, its fuel is hydrogen.

Hydrogen doesn't burn the way oil or gas does. Instead, the tiny particles, or *atoms*, of hydrogen come together. They form a different element called helium. At the same time, they give off energy. This process is known as fusion (FYOO-zhun).

The energy the particles give off during fusion is very powerful. It creates light and heat. The sun's energy is so strong that you feel that light and heat here on earth as sunshine.

Like other stars, the sun has plenty of fuel to last a long time. In fact, the sun has enough hydrogen to keep burning for another five billion years!

Question sent in by Christie Petrie, Raleigh, NC.



THE BLOODHOUND GANG

The Case of the Lifted Loot

by Becky Cheston

ILLUSTRATIONS BY BOB PEPPER

"Wow! Is it freezing out there!" Vikki unbuttoned her coat and shook the snow off her boots. Skip and Ricardo were already sitting in the office, warm and dry.

"Better keep your coat on, Vikki," said Ricardo. "We've got a client coming in and she's got an awfully frosty personality."

"All right already with the bad jokes," Vikki groaned. "Who is this client?"

"Wilma Devine," said Skip. "She runs a little antique shop on Crescent Street called Devine Antiques."

"What does she want with us?" Vikki asked.

"Why don't you let me tell you?" replied a stern voice from the doorway. There stood Wilma Devine. She sure didn't look cold. Not in her full-length mink coat and matching hat. Her personality, however, could have used a little warming up.

She looked around the cluttered office and got right to the point. "A thief has made off with my valuables," she said.

"What did they take?" asked Skip.

"That's what's so curious," answered Wilma. "A number of things were taken, but some very costly items were left behind. Come with me and I'll show you."

Soon the trio and Wilma Devine arrived at the Crescent Street store. Devine Antiques was no junk shop. The shelves were filled with valuable antiques.

Skip admired some gold jewelry that was on display. "Wow!" he said. "You mean they didn't take this?"

"No," answered Wilma. "And it was right out in the open. They also left this." She held up a china vase. "It's worth thousands." Also on display was a set of antique copper cookware, a pearl-studded vest, and some wood carvings.

"Why don't you tell us what *was* taken?" said Vikki.

"They took a pair of steel scissors, with handles inlaid with diamonds. They also took a silk jacket with nickel-plated buttons, a wooden jewelry box with a beautiful iron lock. Oh yes, and some very old iron candlesticks."

"That *is* strange," said Vikki. "Why did the thief leave so many valuables behind?"

"There's no sign that anyone broke in," said Ricardo, examining the door. "Who has a key?"

"Just myself," Wilma said. Then she added, "And Charles, of course."

Wilma introduced the detectives to Charles Temple, her part-time sales clerk. He was a tall young man with a moustache.

The young sales clerk looked nervous and pulled the ends of his moustache.

"I hope you don't think I did it," he said.

"How long have you been working here, Mr. Temple?" Vikki asked.

"Oh, Charles has only been with me for a couple of months," Wilma interrupted. The young man looked very unhappy.

A Cool Customer

Just then the shop door blew open. In stumbled a large bear-like man wrapped in a grey overcoat.

"Milton!" Wilma exclaimed, "I've been robbed!"

"You have?" The big man looked surprised. He took off his hat and unwrapped his scarf. He had small blue eyes and a large nose.

Wilma introduced him. "Bloodhound Gang, I'd like you to meet Milton Beardsley, the man I buy many of my antiques from."

"Pleased to meet you," Milton said politely. "Now, what's this about a robbery?"

Wilma quickly told him.

"Well, it's a lucky thing I stopped by," Milton said when she finished.

"Why did you stop?" asked Vikki.

"Well, it's a funny thing, but my car won't start," Milton said. He seemed embarrassed. "The battery is dead. I wanted to use your phone to call a tow truck."

Just then, Ricardo interrupted.

"Hey it's snowing in here!" he shouted. Snow was drifting down from a crack in the ceiling.

"Are there stairs to the roof?" Skip asked.

"Yes, I'll show you," said Charles Temple.

Some Holes In the Case

Soon everyone was up on the roof, which was flat and covered with a thin layer of snow. Vikki walked to the area where they had seen the crack in the ceiling.

"Ah ha!" she exclaimed. "This solves part of the mystery!" She reached down and lifted a small part of the roof away. Through the hole, you could see the inside of the shop.

Wilma looked upset. "That doesn't solve anything," she said. "That hole is too small for anyone to fit through. How did the thief get in?"

"Maybe there are some other clues here," Ricardo said. He pointed to an assortment of garbage, including cigarette butts, a coil of thin wire, some rope and an iron bar.

"I know!" cried Skip. "The thief used the rope to haul up the stolen goods!"

"But how did he attach them to the rope?" asked Vikki. "And why take only some things?"

"Maybe we'll know if we look at the things that *weren't* taken," added Ricardo.

"That doesn't make any sense," piped up Charles.

"Let's go downstairs," said Vikki.

"About time," added Wilma. "I'm freezing."

When everyone was back downstairs, Ricardo turned to Wilma Devine.

"Now, think," he instructed. "What did all the stolen items have in common?"

"Nothing that I can think of," she answered after a moment. "They're all different."

"And they're not made from the same material, either," added Charles Temple. "The scissors are steel, the candlesticks are iron, the jewelry box is wood and the jacket is silk."

"Yes," Vikki exclaimed. "But the box had an iron lock! And the jacket had nickel-plated buttons! Everything that was stolen was made partly or entirely of metal!"

"Why would a thief want metal?" Wilma asked.

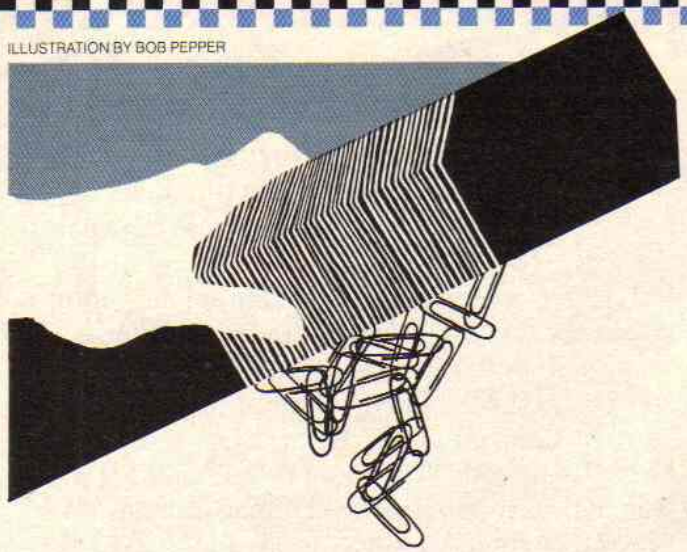
"Because metal can be picked up with a magnet," answered Ricardo.

"The iron bar!" cried Skip.

"Let's test it," said Ricardo. "Charles, are there any paperclips around?"

The sales clerk gave Ricardo a worried look and got some paperclips out of the desk. Ricardo spread them over the counter. Then he took ➡

ILLUSTRATION BY BOB PEPPER



the iron bar and passed it over the paperclips. They didn't move.

"So much for that theory," Milton Beardsley said. "That's no magnet."

"Not now," said Ricardo. "But maybe it can be. Wait here everybody. I'll be right back."

Ricardo went outside to Milton Beardsley's car. A mechanic with a tow truck was there, trying to start the engine. Soon Ricardo returned carrying a large cardboard box. He placed the box on the counter, next to the paperclips.

"You don't suppose he has the missing items there, do you?" Wilma said sarcastically.

"Just give me one minute," Ricardo said, and bent over the box. After a few seconds he turned around. In his hand he held the iron bar, but now it had the coil of wire wrapped around it. He passed the bar over the paperclips. This time, they clung to the bar!

"Now it's a magnet," Ricardo said. Then he reached inside the box. Suddenly, the clips fell off the iron bar. "And now, it's not."

"How did you do that?" Wilma asked.

"It's simple," Ricardo answered, "with this!"

Out of the box he hoisted a large car battery.

"With the battery," said Ricardo, "I turned the iron bar into an electromagnet. You see, magnetism is caused by moving electrical charges. Whenever there is an electric current, like from the battery to the wire, magnetism is produced. When you coil the wire, the magnetic field is greater."

"Then what's the bar for?" asked Skip.

"The bar inside the coil concentrates the magnetic field," Ricardo answered. "When the current flows through the wire, the bar and the coil become a magnet. When you turn off the electricity, the bar goes back to being a simple piece of iron."

"And that's why only some things were missing!" Skip said. "Copper, wood, gold and china are not attracted by magnets."

"I'm sure this is all very interesting," Wilma broke in. "But I still don't have my things, and you still haven't caught the thief."

"Oh, the thief doesn't have to be caught," said Ricardo. "He's right here in this room."

Getting Cold Feet

"I know what you're thinking, but it wasn't me!" exclaimed Charles Temple.

"I know that, Mr. Temple," said Ricardo. As he spoke, Milton Beardsley jumped from his chair and rushed for the door. He was met at the door by Detective Trowbridge and two uniformed police officers.

"If you check out Mr. Beardsley's car, I think you'll find the missing items in the trunk," Ricardo said to the officers.

"How did you know?" Beardsley asked.

"It was just a guess," said Ricardo. "When you said the battery in your car was dead, I thought you might have been using it to power your electromagnet."

"Thanks for the phone call, Ricardo," Detective Trowbridge said. "I guess the Bloodhound Gang has solved another case."

"Yeah," said Skip. "You might say we're attracted to sleuthing."

"That's true," said Ricardo. "And we always stick together!"

Watch for next month's Bloodhound Gang mystery!

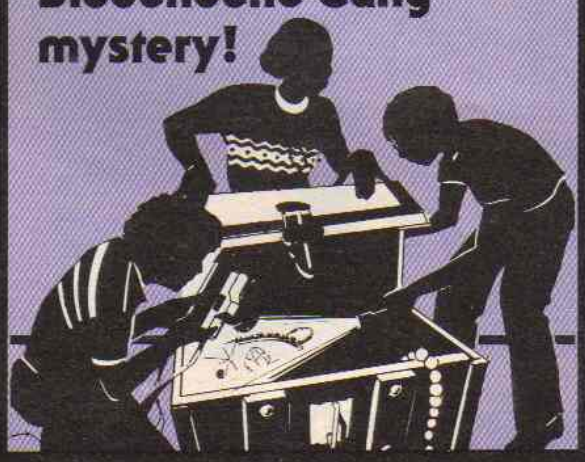


ILLUSTRATION BY DAVE FE BLAND

Win the big orange taste of TANG Drawing Contest!!

And you could be on TV!!

Just draw what the Big Orange Taste of TANG looks like to you. If you win, we'll put your drawing on TV. With you as the star!
Plus WIN $5,000!

1st prize: 10 VCR's and VHS's

2nd prize: 500 kid's director chairs from TANG

3rd prize: 5,000 TANG T-shirts

FREE → coloring pens on specially marked TANG jars!

enter here ↘

Official Rules!

1. To enter the "Big Orange Taste Of TANG" Contest, complete the official entry form and draw your interpretation of the "Big Orange Taste Of TANG" on a piece of paper no larger than 9" × 12." Attach your entry form and proof-of-purchase from TANG to your entry and mail to: "Big Orange Taste Of TANG" Contest, P.O. Box 4960, Kankakee, IL 60902. (A proof-of-purchase is the label from any TANG jar or canister.) **2. Entries must be received by January 31, 1987, to be eligible.** Not responsible for lost, misdirected, or late entries. Mechanical reproductions will not be accepted. **3.** All entries received will be judged on the basis of originality, technique, execution, and presentation according to the "Big Orange Taste Of TANG" theme. Contest is open only to children 14 and under as of date of entry. Judging will be conducted by panels of art experts. Winners will be notified by mail no later than March 31, 1987. Winners must sign and return an affidavit of eligibility within (30) days of notification prior to receipt of prize. Travel winner must also sign and return a waiver of liability. In the event of noncompliance with these requirements, alternative winners will be selected. Any prize or notification of prize award returned to Westport Promotion Group as undeliverable will be awarded to an alternate winner. Each entrant accepts and agrees to be bound by these rules. All original artwork becomes the property of General Foods Corporation. All contestants consent to appear in a TANG commercial and for the use of their photograph and/or likeness for promotion, publicity or advertising purposes without further compensation. Limit one prize to a family or household. Winners are responsible for all federal, state and local taxes. All prizes will be awarded. **4.** There will be (1) one Grand Prize consisting of a trip for you and your family to a filming location where you will appear in a TANG TV commercial, plus $5,000 cash (retail value up to $10,000); (10) ten First Prizes consisting of a VCR and VHS camera (retail value of $2,000); (500) five hundred Second Prizes of kid's director chairs from TANG (retail value $30); and (5,000) five thousand Third Prizes of a "Big Orange Taste Of TANG" T-shirt (retail value $5). No substitution or transfer of prizes is permitted. Prizes are not redeemable for cash. Grand Prize travel will be offered no later than 3/31/88. Minors must travel with the approval of their parent or guardian and must be accompanied by either of them. Employees of General Foods Corporation and Westport Promotion Group, their advertising and promotional agencies and their family members are not eligible. This offer is void in the State of Vermont and wherever prohibited or restricted by law. **5.** For a list of major winners, send a self-addressed, stamped envelope no later than 1/31/87, to: Winners List "Big Orange Taste Of TANG," P.O. Box 5012, Westport, CT 06881-05012. **6.** This program is sponsored by General Foods Corporation, 250 North Street, White Plains, NY 10625.

GENERAL FOODS

What does the big orange taste of TANG look like to you?

Is it so big, you need a ladder to climb to the top of the glass? Or a dump truck just to lift a **TANG** pitcher?

Draw what *you* think the big orange taste looks like and send it in with a **TANG** label —(see rules). Hope you win!

Contest Entry Form

Name_____

Address_____

City_____ State_____ Zip_____

Phone No._____ Birthdate_____

MAIL ENTRY TO:
Big Orange Taste Of TANG Contest
P.O. Box 4960, 3 Stuart Drive, Kankakee, IL 60902

Offer void where prohibited, taxed or otherwise restricted. Offer good only in U.S.A., Puerto Rico and U.S. Government Installations. Certificate may not be transferred, exchanged or sold nor may it be reproduced or copied.

All entries become the property of General Foods Corporation and will not be returned.

ENTRIES MUST BE RECEIVED BY JANUARY 31, 1987.

Do It!

Word Hunt
Endangered Birds

The names of 15 different birds are in this word hunt. They are hidden across, down and diagonally. There are even four that are backwards. Can you find them? (Just look for the words in capital letters.) When you're finished you can find out more about birds on the next page.

Word List

Masked BOBWHITE
California CONDOR
Mississippi Sandhill CRANE
Whooping CRANE
Mexican DUCK
Bald EAGLE
Peregrine FALCON
Hawaiian GOOSE
Florida KITE
Thick-Billed PARROT
Santa Barbara Song SPARROW
Trumpeter SWAN
California Least TERN
Kirtland's WARBLER
Red-Cockaded WOODPECKER

Answers on the Did It! page.

For the Birds

A CONTACT PHOTO QUIZ

by Andrew Nachison

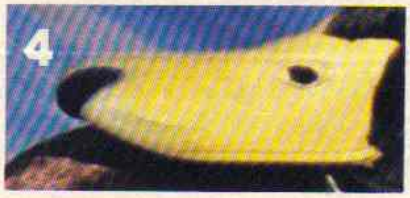
What animal has its lips, teeth, jaws and hands all in one handy-dandy place? A bird! Using its bill (or beak), a bird can dig for food, catch it, and carry it to its nest. Then the bill acts like a set of teeth to chew the food.

Can you match the bird bills with the food each bird eats? Then try to guess the names of the birds. Turn the page for the answers.

It's as bright and colorful as the food it eats. Maybe you'll need a friend to help you with this one: *two can* figure it out with ease.

Hmmmm—here's a toughie. This tiny bird flies like a helicopter from meal to meal.

This one makes fun of everyone and likes to picnic in the *grass.*



Just like Donald and Daffy, this bird waddles on land and glides through the water.

It soars through the sky and has super-keen eyes. Now here's the *catch:* It looks like someone shaved its head!

SEE DID IT! PAGE FOR PHOTO CREDITS

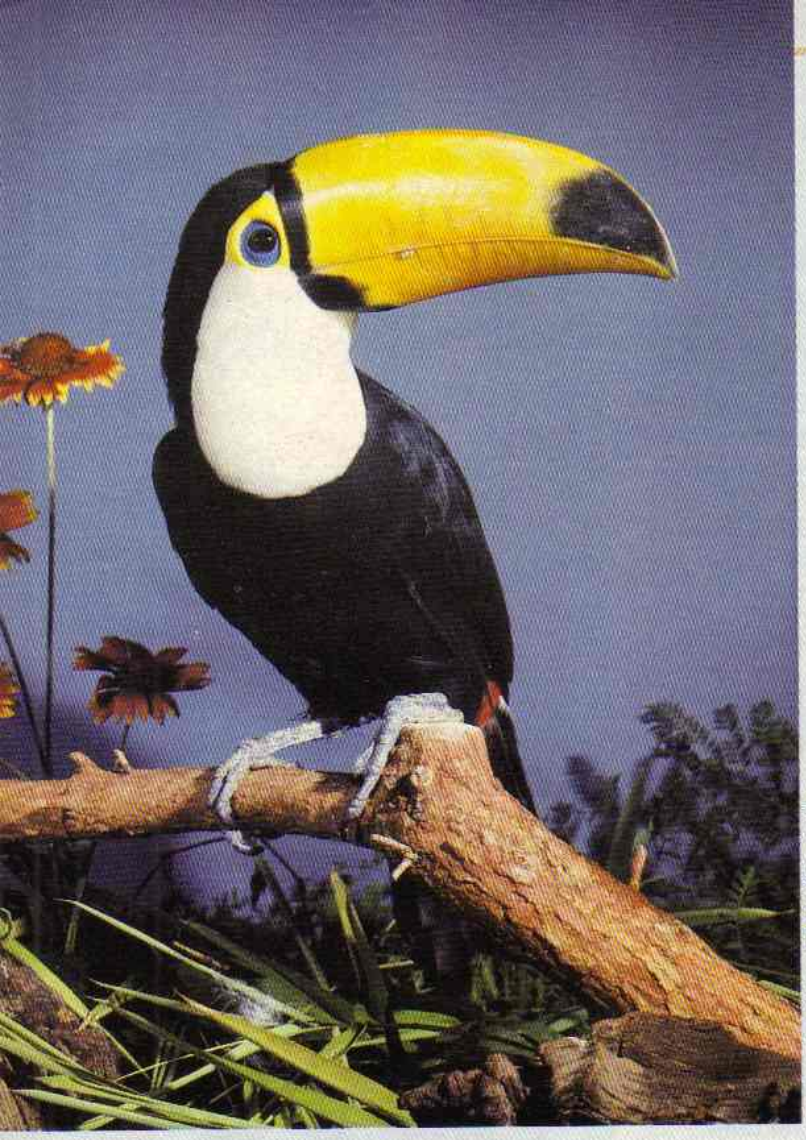


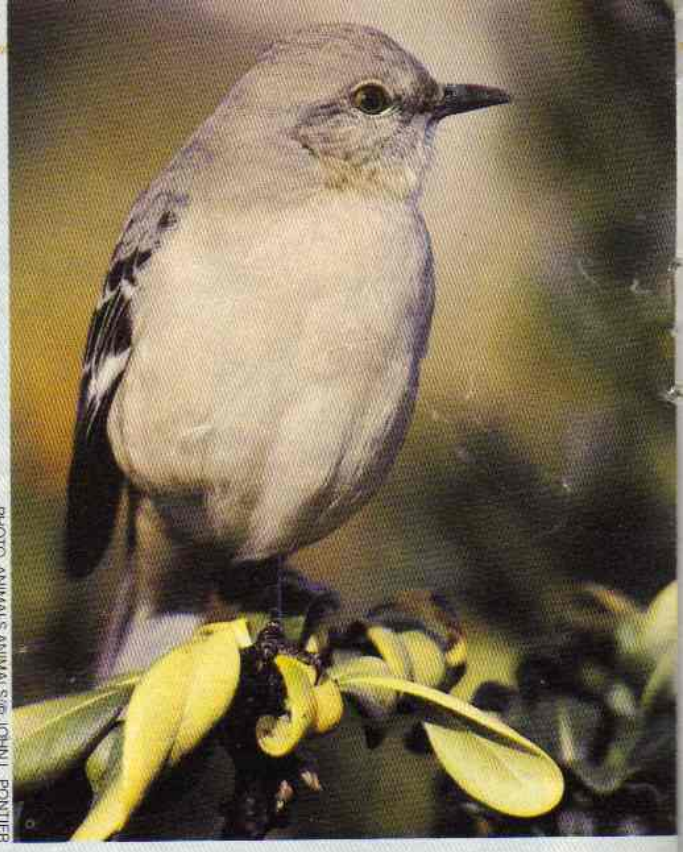
PHOTO © JOHN CHELLMAN/ANIMALS ANIMALS

1D Toucan

Two can guess that this is a toucan, a tropical bird that lives in South America. This noisy bird eats small fruits like strawberries. The toucan's bill has sharp, jagged edges which it uses to tear pieces off larger fruits such as bananas.

2C Hummingbird

The hummingbird's wings flap so fast that the bird can hover in the air like a helicopter. The long, narrow bill is shaped like a straw so it can suck nectar from flowers—the same way that bees do. (Nectar is the sweet, sugary liquid found inside of flowers). The 2¼-inch-long Cuban bee hummingbird is the smallest bird in the world. People say it looks like a bumble bee!



PHOTO, ANIMALS ANIMALS/© JOHN L. PONTIER

3B Mockingbird

If a bird picnics in the grass, then what else would it eat but *grass*hoppers? The mockingbird's small bill is just right for eating insects. The bird gets its name because of its amazing ability to imitate, or mock, calls of other animals. Not only can the mockingbird imitate the call of other birds, but it has also been heard imitating barking dogs and the notes of a piano!

PHOTO, ANIMALS ANIMALS/R.H. ARMSTRONG

PHOTO: ANIMALS ANIMALS/© M.A. CHAPPELL

4E Mallard

Like Donald and Daffy, the bird in our photo is a kind of duck. It's called a mallard. The mallard mostly lives on shallow freshwater lakes or ponds. It dips its wide bill into the water and takes in a mouthful of water or mud. Then, the mallard strains the water or mud with special strainers inside its mouth. It holds on to foods it can eat, like seeds and tadpoles.

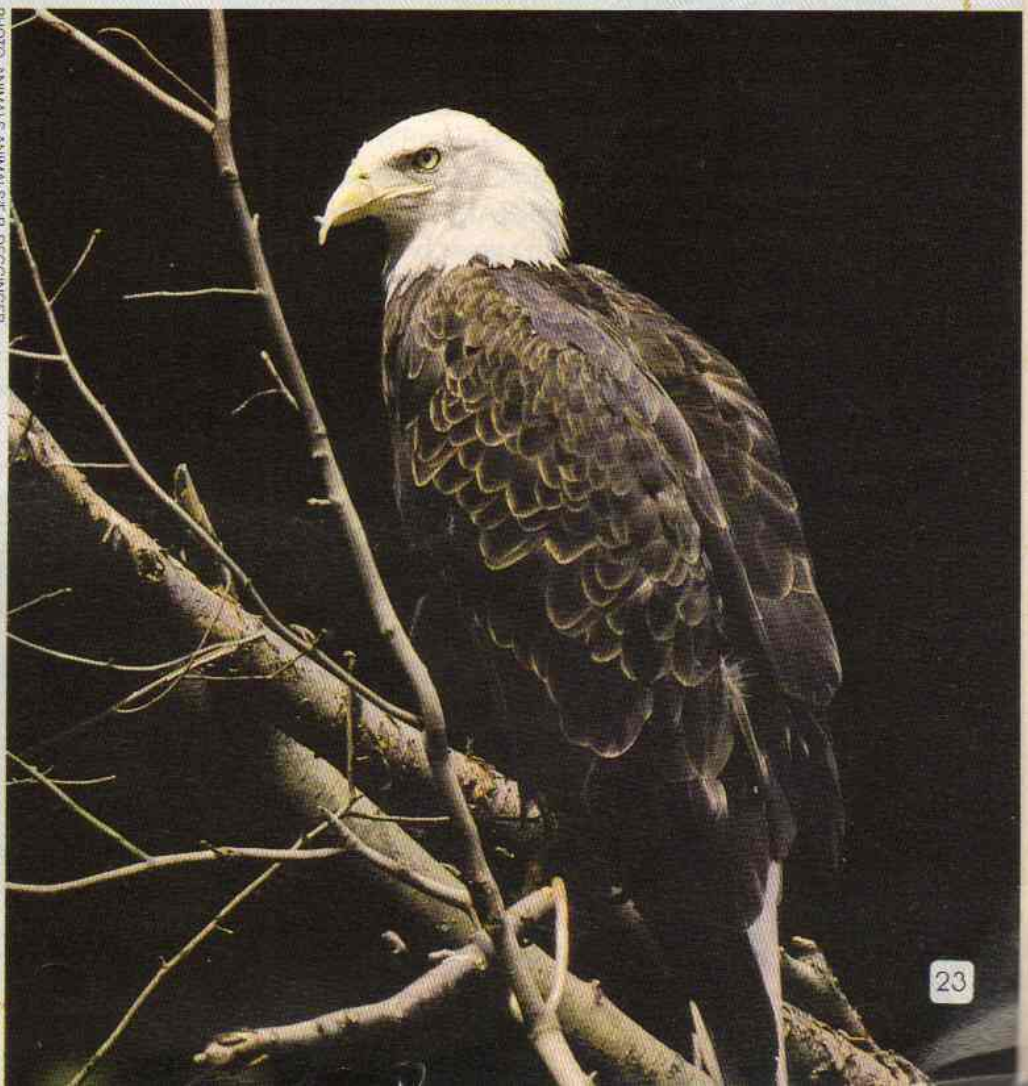
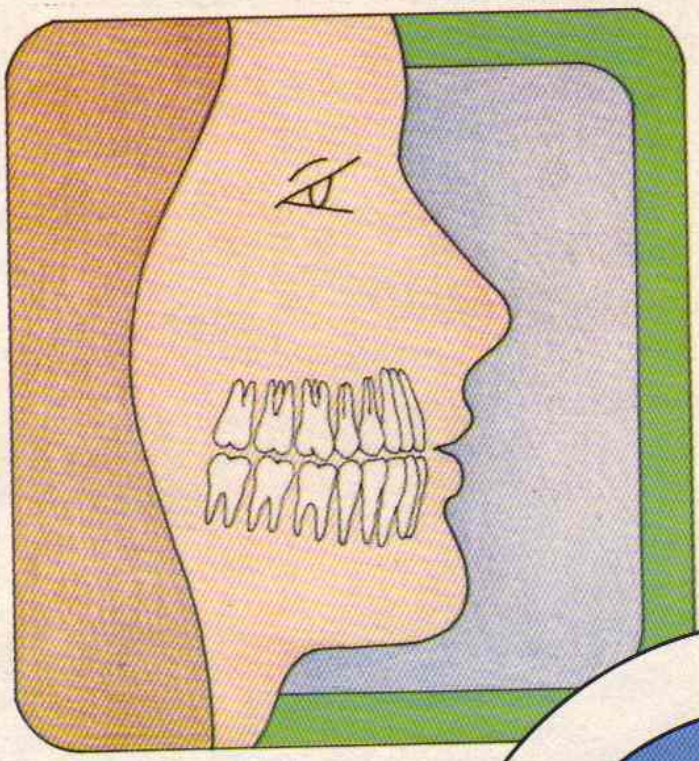


PHOTO: ANIMALS ANIMALS/E.R. DEGGINGER

5A Eagle

The *catch* is actually fish, which is mostly what the bald eagle eats. The bald eagle is the national bird of the U.S. (Does that mean fish is our national bird food?) The bird uses its sharp eyes to spot small animals from the air. To eat these animals, the eagle uses its hard, pointy, hooked bill as a knife. Oh, by the way, the bald eagle isn't really bald, but the white feathers on its head make it look like it is.

Teeth



by Megan Stine & H. William Stine

Think back to when you were a little kid. How many teeth did you lose? It probably doesn't seem like it, but you had 20 baby teeth in all. There were 10 on top and 10 on the bottom. Since then you've lost a lot of them. Your adult teeth are practically all in. Count your teeth. Most kids have 28 adult teeth by the time they are 12 years old. You need 32 teeth for a full set. But those last four wisdom teeth won't come in until they're good and ready, if at all!

Say Cheeeeese!

It's mirror time again, gang. Time to sit down in front of a mirror and smile. See all those pearly white teeth in there? Did you know that those teeth are the hardest things in your body? Besides that, they have blood and veins in them too! But we'll get to the gross part in a minute. First we have to start from the outside and work our way in—just like cavities!

The outside layer of your tooth is made of something called enamel (ee-NAM-ull). It's harder than your bones. Enamel can't grow because it isn't really alive. Touch it and it doesn't hurt, right? That's because it's doing a good job of protecting the next layer—called dentin.

Dentin makes up the biggest part of your tooth. It's the part that hurts when the dentist drills into it. Inside the dentin is the pulp, where all the blood is! Bet you *still* can't believe you have blood in your teeth—unless you've ever broken one.

Tooth Types

All your teeth look pretty much the same. But each tooth has a particular name and job. Some people have been known to name their teeth Harry and Barbara and Roscoe. Although this is friendly, it can get very confusing.

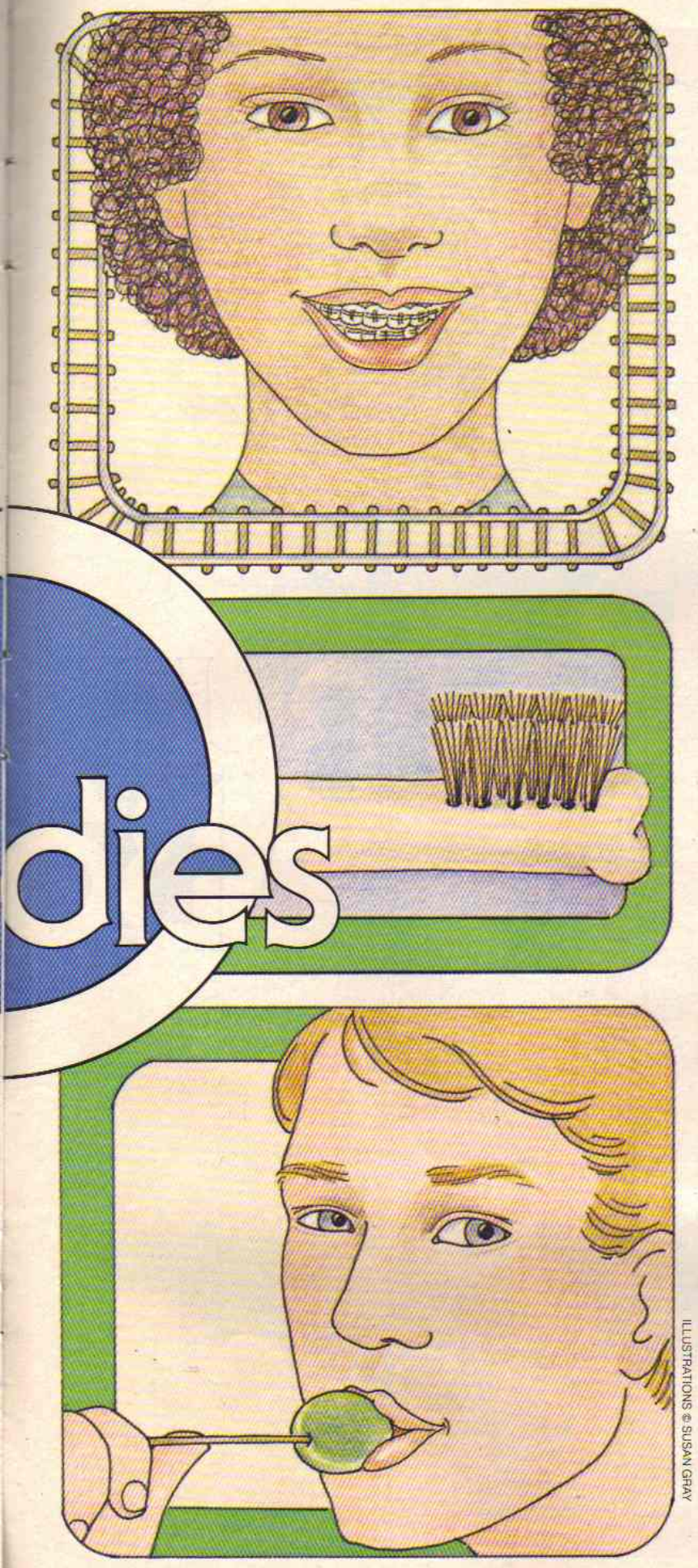
Open up and say AHHHHHH! Wider please. Good. Now count along. Your front teeth on top and the four on the bottom are called *incisors* (in-SIZE-ors). Behind them are the *cuspids* (KUSS-pids), one on each end. These teeth are pointy like a dog's. So they are also known as "canine" teeth. Next come two *premolars* (pree-MOE-lurz) on every end. Finally, all the way in the back, there are your molars.

You use your incisors and cuspids for biting and grasping food. Your premolars and molars are for chewing up things. Try this for a change. Chew a piece of gum using just your front teeth. Or try to eat an apple using only your molars. Weird, huh?

Brace Yourselves, Gang

What do metal-mouthed, braces-wearing kids have in common with Diana Ross, Michael Jackson, Dickie Smothers and Phyllis Diller? Their braces, of course!

The real surprise is that these famous people wore braces *after* they had grown up. So if you've got a mouthful of "railroad tracks," don't worry. You're in pretty cool company.



Someday only you and your doctor will know if you are wearing braces. It sounds too good to be true, but one new kind of braces is almost invisible. These are made like old-fashioned braces. But instead of metal, they are made of plastic the same color as teeth. Get it? They are there, but people can hardly see them.

Even better is another new kind of braces. These are attached to the backs of your teeth. You can feel them with your tongue. But no one can see them when you smile.

These new kinds of braces sound like an out-of-sight idea. But they are still being developed. In the meantime, most kids will have to stick to the old kind. Sorry guys!

Crime Pays!

William Addis was thrown in jail in 1770. One morning, he sat in his cell cleaning his teeth with an old rag. William wasn't weird or anything. Back then, that's the way people cleaned their teeth.

Before long, William got a brainstorm. He took an old bone from his supper and bored tiny holes in it. Then he got some bristles. He glued a clump of them into each hole. That's right, dental fans. William Addis invented the world's first toothbrush.

When he got out of jail, Addis went into the toothbrush-making business. And, so the story goes, he lived happily ever after.

Don't Be a Sucker

Yes, chewing gum can cause cavities! But sucking on hard candies is even *worse*.

Your teeth are covered with plaque (PLACK). This is a thin, sticky layer of germs. (In fact, dentists say that human mouths are the dirtiest of all. So go kiss your dog!) When plaque mixes with sugar, it forms acid. It's this acid that eats into your teeth, making cavities. The longer sugar stays in your mouth, the more acid it produces. So even though chewing gum is bad, most of the sugar gets chewed out pretty fast. You're only left with the gum in your mouth. Hard candies take longer to melt away. Meanwhile, acid starts drilling into your teeth. You know who has to drill after that! So give germs the brush-off after every meal.

Experiment: The Shell Game

Want to see how cavities form, without ending up in the dentist's office? Try this experiment. Put a piece of egg shell in a cup of vinegar. Stick another piece in a glass of water. Let them sit for a few days. You will find that the shell in water stays the same. But the one in vinegar gets soft, rubbery and weak.

What does this have to do with cavities? More than you might think. Vinegar is an acid, like the stuff that forms in your mouth. Egg shells are made of calcium (KAL-see-um). This is the same thing that makes your teeth hard. Acid eats away at the calcium in the egg shell and makes it weaker. The same kind of thing happens in your mouth when you get a cavity.

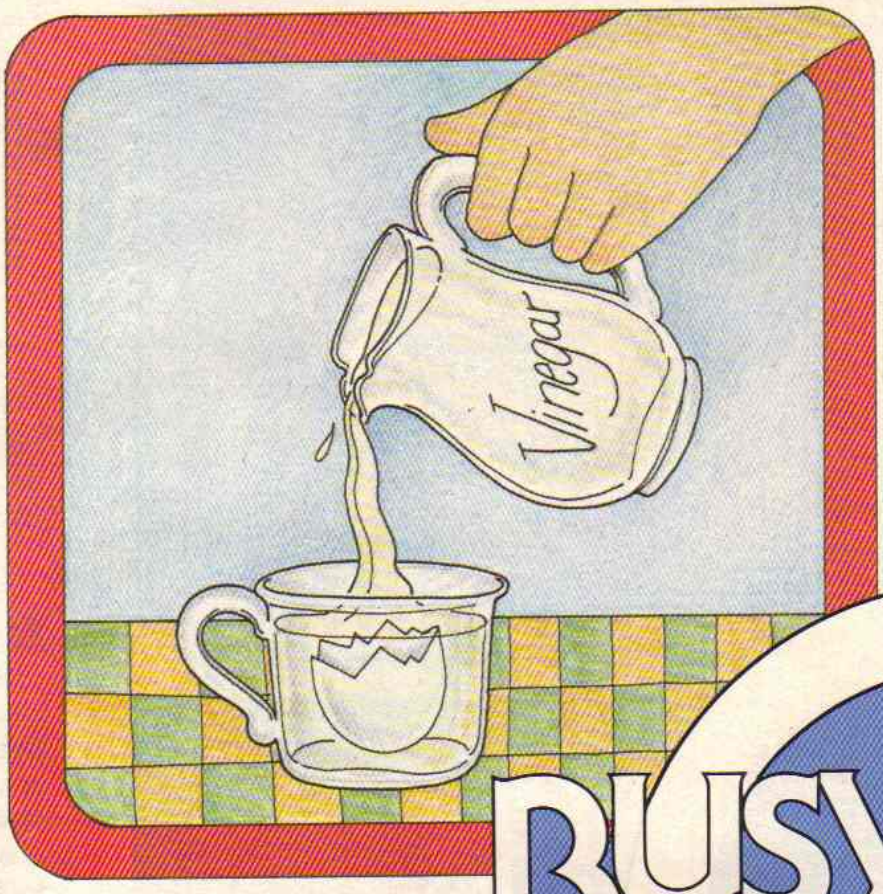
There is also a great trick to try with a hard boiled egg and a cup of vinegar. After the egg has soaked for a few days, you should be able to bounce it! This gets good laughs with very nervous adults who think they're about to have a floor full of raw egg to clean up.

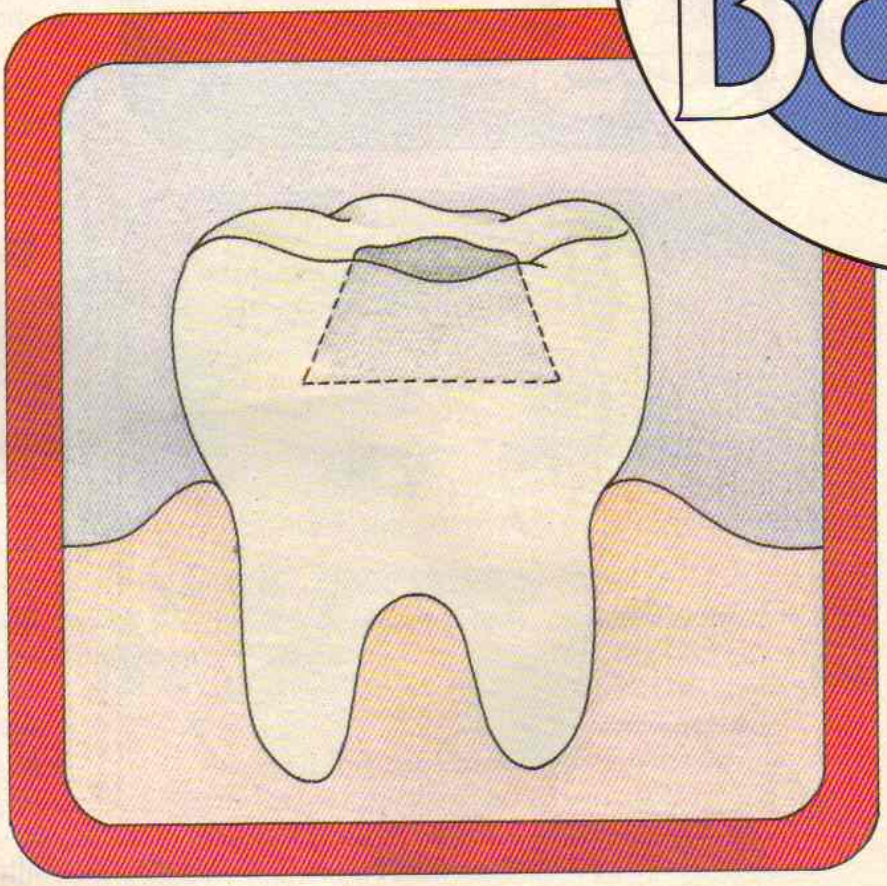
Why Fillings Are Huge

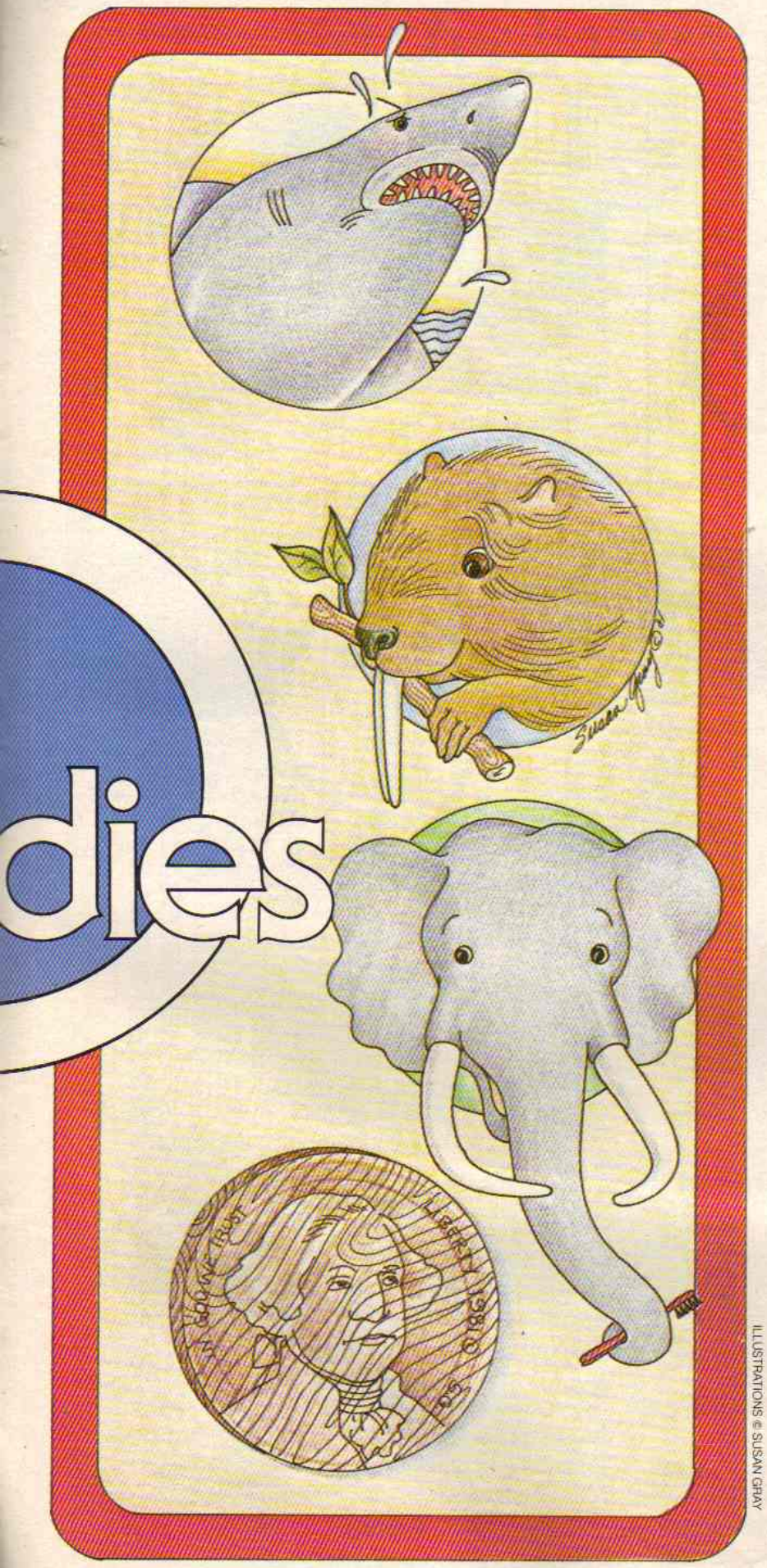
When you look in the mirror you can't ever see your cavities. But when you get to the dentist, she drills a hole that seems as big as the Grand Canyon! Why? Two reasons. One is to make sure there's no tooth decay left. If germs are left they can keep eating your tooth even with the filling on top. The second reason is also the answer to:

Why Fillings Don't Fall Out

They don't fall out because the dentist drills a hole shaped like an upside-down "V." The top is narrow, the bottom is wide. (In your top teeth the "V" is right-side up.) When the silver or plastic filling hardens into a V shape, the fat part won't fit through the skinny neck. And that's why fillings don't fall out.







ILLUSTRATIONS © SUSAN GRAY

Mouthing Off

Teeth are for more than eating. Teeth are for talking, too. Try saying anything—for instance, the word "anything"—without letting your tongue touch your teeth. Now try saying "toothbrush." Now try "I'm not talking to myself. I'm just doing an experiment with my teeth." Now look embarrassed. After all, you *were* talking to yourself and you know it.

A Few Fast Fun Facts About Teeth

*Just our luck, sharks' teeth grow back no matter how many times they lose them.

*Beavers' teeth never stop growing. By chewing wood, beavers can keep their teeth down to size. And speaking of size, huge elephant tusks are really elephant teeth. They never stop growing, either.

*Some peoples' fillings in their teeth act like a radio antenna and these people pick up radio signals in their heads. No kidding!

*Some people have a *supernumerary*. That's an extra tooth somewhere in their mouths. You probably need extra teeth just to pronounce that mouthful!

*John Massis of Belgium pulled two railway cars with his teeth. The next challenge for the world's strongest teeth may be chewing through school cafeteria food!

And Don't Take Any Wooden Nickels Either

Everyone knows about George Washington and his famous wooden false teeth. They didn't fit right, they didn't look right and they didn't work right. So George had a set of false teeth made out of old human teeth and elk teeth. Yuk and double yuk.

If George Washington were alive today he could get false teeth made out of plastic. Or he could get them made out of porcelain (POR-sel-en) which is the same stuff they use to make kitchen sinks . . . Uh-oh—Yuk again!

Contact Lens

PHOTO © CTW/ERIC LIEBOWITZ

We've Got Your Number!...

...and it's a brand-new television series called *Square One TV*. It's written and produced by the Children's Television Workshop —the folks who bring you *3-2-1 Contact*.

Starting January 26, the cast of *Square One TV* (photo above) will tell you everything you always wanted to know about mathematics and numbers. And they're set to do it in a really cool way.

For instance, you'll be tapping your digits (toes and fingers, that is) to music videos including "Angle Dance." You'll be laughing (and learning) at zany takeoffs of favorite classic TV-show characters: Superguy, I Love Lupy and The Phoneymooners.

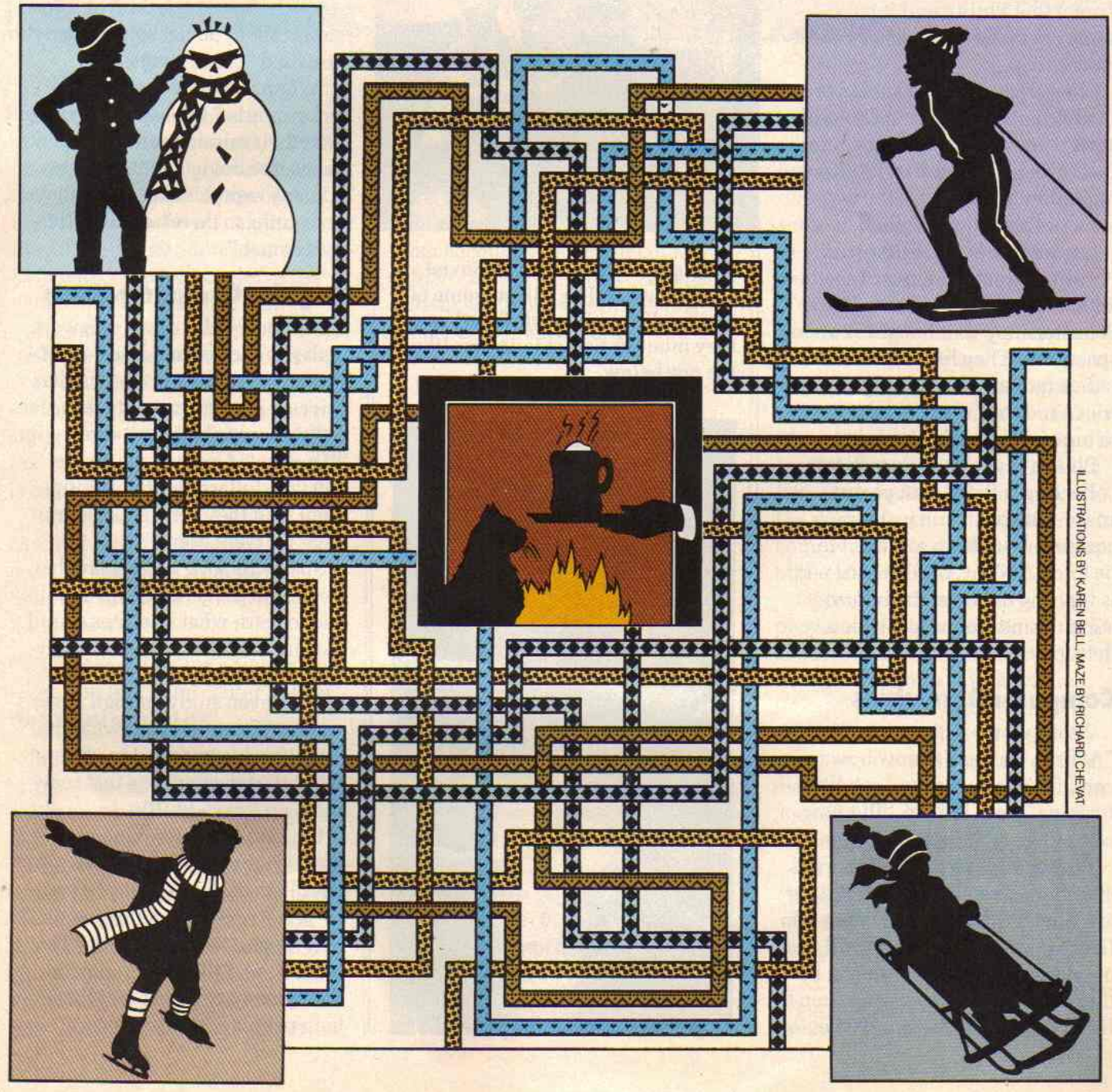
The writers of the show haven't forgotten to figure in a lot of guest stars. Upcoming episodes feature such people as athletes Sugar Ray Leonard and Dr. J., rappers Kurtis Blow and the Fat Boys, and actress Phoebe Cates.

Blackstone the Magician will put some magic into numbers as he shows you how to do tricks that are—um—"mind-numbering." And of course, we haven't forgotten the mystery of mathematics (and the fact that even number mysteries can be solved). Watch for the miniseries "Mathnet" in which Kate Monday and George Frankly use mathematics to solve crimes and save the day.

You can see *Square One TV* five days a week. Just check your local newspaper listing for time and channel in your area. Remember, it begins on January 26. So tune in and watch your number come up!

A Snowy Scramble

The skier, the skater, the sledder and the snowman-maker are all having fun. But now it's time to go inside and warm up by the fire with some hot cocoa. Only one of the kids is on the path that leads to the fireplace. Can you figure out which kid? **Answer on the Did It! page.**



ILLUSTRATIONS BY KAREN BELL. MAZE BY RICHARD CHEVAT.

Space Detectives

by Russell Miller

Phillip Naranjo and Jim Frangione are just like all the other kids in Old Tappan High School in New Jersey. Except that Phillip and Jim go home after school and track Soviet spaceships.

They aren't spies, or sneaks or shady characters. Like millions of other teens, they're just into outer space. The difference is: Phillip and Jim follow space traffic the way most people follow football.

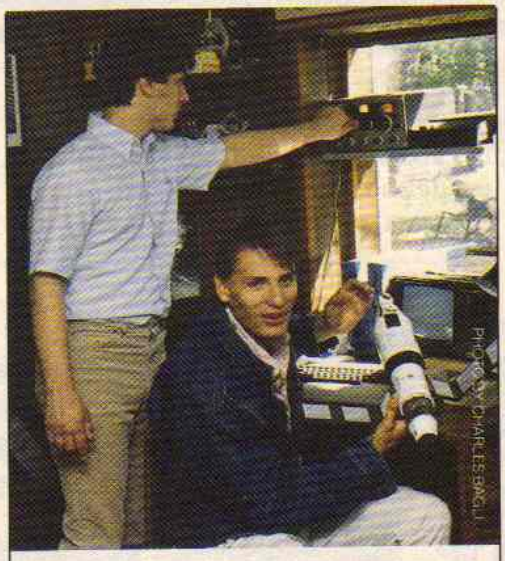
Jim is a junior at Old Tappan. Phillip graduated in June. Together with another friend named Eric Schaefer, they watch night skies for spacecraft. They listen to shortwave radios for news from foreign countries. And they use special antennas to tune in to signals from space.

Phillip says that high-tech fact collecting is the easiest part of space-tracking. "You just scrape equipment up from somewhere," he told CONTACT. "The hard part is figuring out what the information means. You've got to be a detective."

Computer Detectives

That's where computers come in. "At first, we didn't know how to combine computers and satellite tracking," says Phillip. "But now computers make the job easier."

Phillip and Jim track as many as 40 different satellites, three or four at a time. With computers, they can figure out which satellites will pass overhead and how long they'll be there. That way, they know when to listen to their radios—and what to listen for.



Phillip holds a model of a Soviet satellite while Jim adjusts some of their radio equipment. Together they monitor Soviet launches like the one below.

Computers also help them figure out why different satellites are used and when new ones are going to be launched. Jim and Phillip have put together computerized diagrams of Soviet spacecraft. And they've collected databases chockful of information about Soviet astronauts, who are called "cosmonauts."

"When we know cosmonauts' backgrounds," Jim says, "we can tell what their missions are. For instance, the Soviets sent up an astronomy expert, so we knew they were going to do research on Halley's comet."

Regular Computer-Users

Jim and Phillip do all this work with regular Commodore 64 computers. They don't even own disk drives—just data cassette recorders.

"It's hard to believe," admits Jim. "We showed experts who have 250,000 dollars' worth of equipment, and they were amazed by what we were doing."

Space-tracking takes more than electronic gadgets. Phillip and Jim had to learn what satellites sound like on their special radios. They had to study physics and math.

They even study foreign governments. "To understand what the satellites do, you need to understand the governments that send them up," says Phillip.

Jim says space-tracking is more than a hobby. It lets "ordinary" people in on the secrets of space.

"Ninety percent of the people play sports," he explained. "That's played out. I like doing something that nobody else does and that may help people some day."

The Slipped Disk Show

ILLUSTRATION BY CAMERON EAGLE

Happy New Year, hackers! I hope you're all looking forward to 1987. I know I am! WDSK got me this neat new mobile studio for the back of my Slipmobile. Now I can broadcast the *Slipped Disk Show* from a drive-in movie or the parking lot of the neighborhood shopping mall.

Speaking of the new year, it's time for New Year's resolutions. Last year, I made a New Year's resolution to change my socks. This year, I'm going to try something even harder. For 1987, my New Year's resolution is to *find* my socks.

But before I find my socks, I bet I can find the first question for this month's show. It's from **Julie Shapiro,** 12, of Marathon, New York. She asks:

"Why does it damage a floppy disk when you touch the center hole or when dust gets on it?"

Julie, floppy disks are sensitive things. Not only are their feelings easily hurt but they always cry during the sad parts of a movie.

But seriously, it's not a good idea to touch the inner ring or *any* part of a floppy disk. Only touch the cardboard or plastic sleeve that holds the disk.

The data on a disk is stored in a very thin layer of magnetic film. This layer is very delicate. Oil, moisture or dust on your fingers can damage it and make it impossible for it to be read by your disk drive. You should also keep your disks from becoming too hot or cold, which can warp the disk. And make sure never to put a floppy near a magnet. That will definitely destroy any data on the disk.

However, I *can* put my fingers on the next computer question, which is from **David Jacobson,** 9, of San Francisco, California. David wants to know:

"What is A.I.?"

David, A.I. stands for *artificial intelligence*. Artificial intelligence is just like an artificial sweetener except it's not sweet, it doesn't come in little packets that you tear open and put in coffee, and you can't make diet soft drinks with it.

All kidding aside, artificial intelligence is the name for any attempt to make computers think like human beings. It may seem that computers are *already* very smart, but they really aren't. Most computers are good at two things: adding or subtracting large lists of numbers and storing lots of information like a filing system.

Your computer may seem to have a mind of its own. For example, a computer game may give you funny answers to your questions. But that doesn't mean your computer has a sense of humor. It just means a human has designed a clever program to answer your questions that way.

Scientists are trying to build computers that will think the way a human does. They are creating programs that write poetry, play chess or hold conversations with humans (through a keyboard). But one problem is that scientists don't agree on how humans think. In many ways, the study of artificial intelligence in computers is linked to new studies of the human brain.

Of course, my problem is that people think *I'm* an artificial intelligence. I'm not (I think). I don't even let my computer answer my mail (except during my vacation). So remember, if you have a computer question you'd like answered by a real live human floppy disk jockey, just send it to:

The Slipped Disk Show
3-2-1 CONTACT Magazine
1 Lincoln Plaza
New York, N.Y. 10023

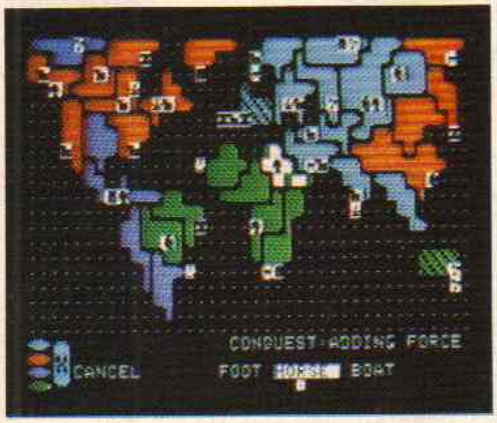
See ya next month!

Slipped Disk does not use artificial intelligence, but he probably should.

reviews

by Phil Wiswell and Bill Gillette

All software is rated on a scale of one to 10, based on Phil and Bill's overall reaction. A rating of 10 is the very best.



Lords of Conquest

(Electronic Arts, Commodore 64, $33; also available for Apple II and Atari)

Description: A computer board game. The object is to conquer the world.
Playability: Excellent strategy game. Will keep you playing for hours.
Graphics: Not great, but this game doesn't need fancy screens.
Originality: Similar to Risk and other board games. But no other computer board game is as good.
Rating: 9 ★★★★★★★★★

The neatest thing about this "conquer the world" game is that the map board is not fixed. You can play on one of 19 preset boards such as "Ancient Rome," or you can create your own!

Each game turn has five phases: Development, Production, Trading, Shipment and Conquest. The object is to increase your wealth and control more territory. You can play against the computer or with up to three friends.

Super Cycle

(Epyx, Commodore 64; $35)

Description: A motorcycle race game.
Playability: Does a good job of putting you in the driver's seat.
Graphics: Very good. We really enjoyed the snaking roadways.
Originality: Nearly identical to *Pole Position*, but with motorcycles instead of cars.
Rating: 7 ★★★★★★★

The graphics, sound effects and joystick play of this one-player game combine to form a wonderful motorcycle race. You race against computer-controlled bikes and you must shift gears, accelerate, brake, and lean into the turns. Be careful not to bump into another cycle too hard or you'll crash.

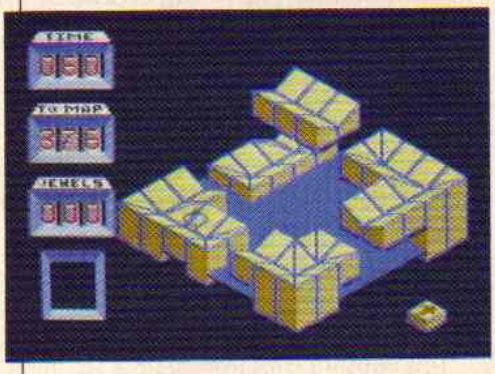
The computer-controlled cycles do their best to get in your way and there are some pretty wild turns. And of course there are oil spills to avoid and bonus flags to collect for extra points.

Super Cycle is put together very well. There are three different courses at different levels of skill. The only thing we missed was having a two-player game.

Spin Dizzy

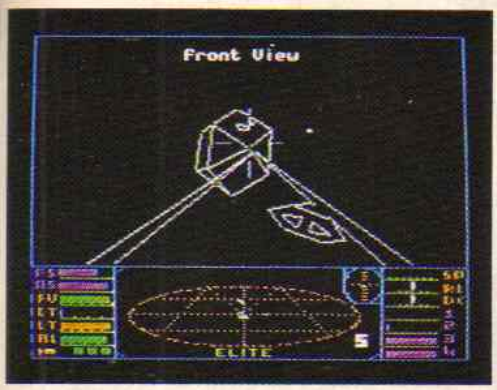
(Activision, Commodore 64, $35)

Description: A pure arcade action game of maneuvering an object through a three-dimensional maze.
Playability: A wonderful game—difficult to stop.
Graphics: Excellent, with hundreds of different screens you must master.
Originality: A variation of the very popular arcade game *Marble Madness*.
Rating: 9 ★★★★★★★★★



In *Spin Dizzy* you use your joystick to carefully guide a marble, a top or a gyroscope through a three-dimensional maze. Each maze is part of an enormous game map.

Hundreds of different playing screens are connected, and there are plenty of deadends and pitfalls to keep you on your toes. There are treasures to collect along the way, many placed dangerously close to the edge of the maze. The joystick skill required doesn't come naturally. It took us a while to learn not to lose our marbles when we crossed a narrow ledge. But neither of us can stop playing. This is one of the best maze games ever written.



Elite

(Firebird, Apple II, $40; also available for the Commodore 64)

Description: A complex space war adventure.
Graphics: Good for action, but not very colorful or interesting.
Playability: Much too difficult. Too demanding of your joystick skills.
Originality: Similar to other space war games, but impossible to play.
Rating: 3 ★★★

We didn't like *Elite* right from the start. To make sure that you can only play with a store-bought copy, you have to use a plastic lens to read coded characters on the screen before you can even start playing. The instructions are so poor that this took us two hours.

Once we got started we were faced with impossible tasks. You're supposed to travel from planet to planet, trading and fighting off alien pirates. The problem is, you are attacked almost constantly and it is very hard to fight off pirates or even recognize which ships are the bad guys. Several times we blasted our own outposts without knowing it.

The action was much more violent than *Star Flight*, and there was none of the role playing that made *Star Flight* so interesting. We like a good challenge, but the challenge of *Elite* is too steep.

Tass Times In Tonetown

(Activision, Commodore 64/128, $35)

Description: A "radical, new-wave" graphics/text adventure that takes place in a strange world.
Playability: Very good, but the game will take weeks or months to solve.
Graphics: Nothing special, but pay attention—you need the pictures to solve the adventure.
Originality: You truly feel you've left the real world behind.
Rating: 7 ★★★★★★★

This is a super-modern *Wizard Of Oz* story that is as strange as it is fun to play. Your goal is to locate a missing character called Gramps. The problem is, he was last seen in Tonetown, a very strange place where nothing is familiar. Just getting along with the people who live there is a chore. You'll have to learn to dress and talk like them. Be prepared for anything.

Each scene has text and graphics and there are clues (real and fake) hidden all over. You can use the keyboard or the joystick to move from scene to scene.

Tonetown is a really swinging place, loaded with strange people and places to explore. At first it may seem like you're trapped in a nightmare, but after a while, you may not want to leave. It turns out to be a fun place after all.

Star Flight

(Electronic Arts, IBM PC, $40)

Description: A game of space travel and adventure.
Playability: A little slow, but once you're hooked, you'll be skipping dinner! This game takes a lot of time.
Graphics: Very appealing.
Originality: A fresh approach to space games that combines space-war with role-playing.
Rating: 8 ★★★★★★★★

You've got to have a lot of time on your hands to play *Star Flight*, but what a great game! There is a lot of preparation for your journey through space. Before blasting off, you must select a crew of five and assign them positions on your starship, buy goods and supplies and outfit your ship.

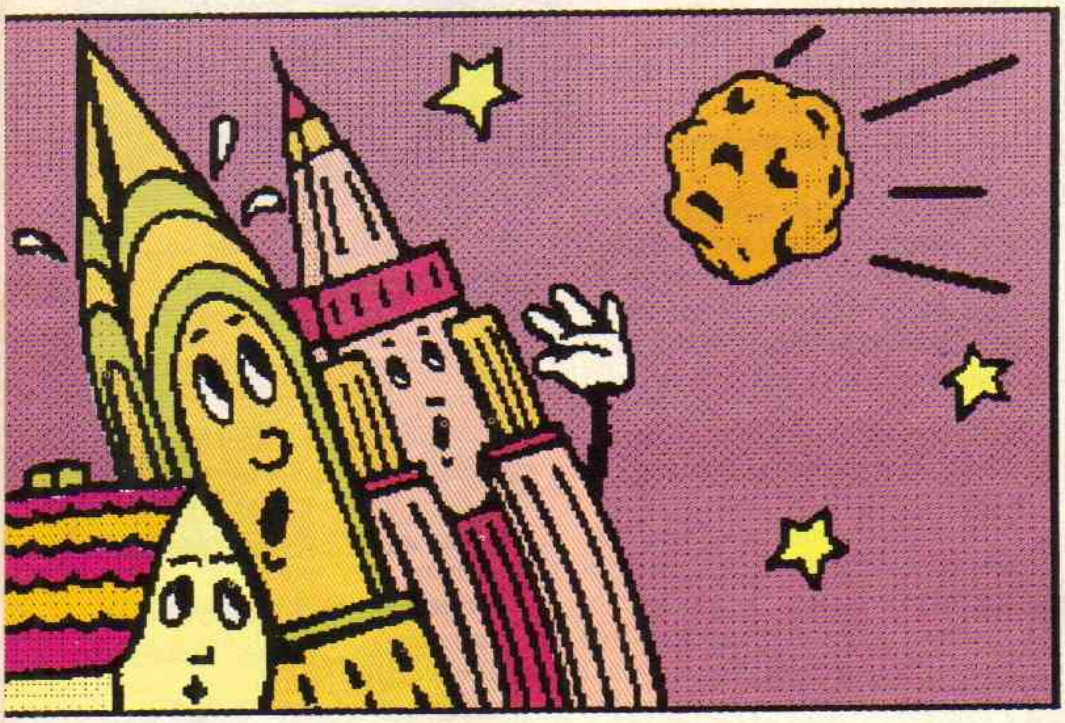
Of course, once you launch there's even more to do. We've been playing for weeks and we have no idea of how many worlds there are to explore. So far, we've orbited hundreds of planets and stars. The farther you go, the better your crew gets at detecting problems ahead of time. You'll need patience and an interest in space fantasy to enjoy *Star Flight*. It's a long mission.

Phil Wiswell, father of three, is a computer consultant and writer.

Bill Gillette, 16, is a student with a passion for computers.

basic training

PROGRAMS FOR YOUR COMPUTER



Meteor

IBM

When Halley's Comet was in sight last year, some people were nervous about comets hitting the Earth. Well, now that it's on its way back to the edge of the solar system, we can all relax. That is, except for the people who live in the houses drawn by this program.

Unfortunately, their homes are about to be squashed by a meteor from outer space! **Bryan Lucas,** 14, of Aurora, Colorado created this *smashing* program.

```
10   SCREEN 1:KEY OFF
20   CLS:SOUND ON
30   LINE(1,198)-(320,198),2
40   LINE(1,199)-(320,199),2
50   LINE(1,175)-(40,197),2,B
60   LINE(45,175)-(85,197),2,B
70   LINE(90,175)-(130,197),2,B
80   LINE(135,175)-(175,197),2,B
90   LINE(180,175)-(220,197),2,B
100  LINE(225,175)-(265,197),2,B
110  LINE(270,175)-(310,197),2,B
120  FOR Z=1 TO 170 STEP 5
130  SOUND 500-Z,3,15,0
140  CIRCLE(Z,Z),7
150  PAINT(Z,Z),10
160  PAINT(Z,Z),0
170  PAINT(Z,Z),0
180  NEXT Z
190  SOUND 37,17,15,0
200  FOR D=1 TO 1000: NEXT D
210  FOR P=1 TO 115 STEP 6
220  Z=198
230  FOR D=1 TO 100:NEXT D
240  SOUND 300+P,1,15,0
250  CIRCLE(Z,Z),P,,,3/12
260  LINE(180,175)-(220,197),0,B
270  IF P<>31 THEN 300
280  LINE(135,175)-(175,197),0,B
290  LINE(225,175)-(265,197),0,B
300  IF P<>79 THEN 330
310  LINE(270,175)-(310,197),0,B
320  LINE(90,175)-(130,197),0,B
330  NEXT P
```

X-tra!!!

Apple

Here's an X-tra special colorful program to run on your Apple II. It was X-ecuted by **Todd Zimnoch,** of Baltimore, Maryland, and we think it is X-cellent!

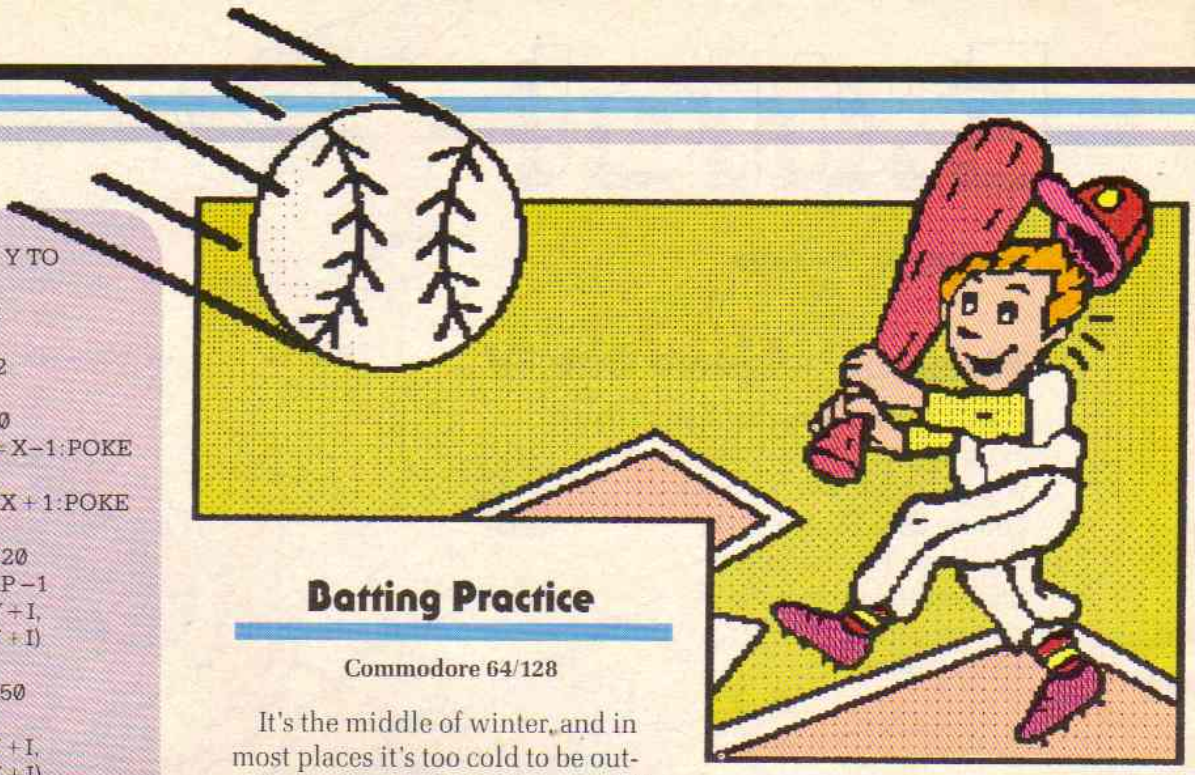
```
10   HOME : GR
20   COLOR= 1
30   FOR S = 0 TO 39
40   VLIN 0,39 AT S
50   NEXT S
60   FOR S = 0 TO 39
70   COLOR= INT ( RND (1)*
     232 + 1)
80   PLOT 0,S: PLOT S,S: PLOT S,0:
     PLOT 39,S: PLOT S, 39: PLOT
     39-S,S: PLOT S,39-S
90   NEXT S
100  GOTO 30
```

Canary

Atari

This program is as free as a *bird*. We won't even send you a *bill*. Run it, and you can use your joystick to make your Atari sing like a canary. Thanks to **John Dean,** 13, of Kearnysville, West Virginia for *hatching* this program.

```
10   GRAPHICS 2
20   SETCOLOR 2,0,0
25   X=120:Y=48
30   A=PEEK(106)-8:POKE
     54279,A
40   PM=256*A
50   POKE 53248,X
60   FOR I=PM+512 TO PM+640
70   POKE I,0:NEXT I
80   POKE 704,26
```

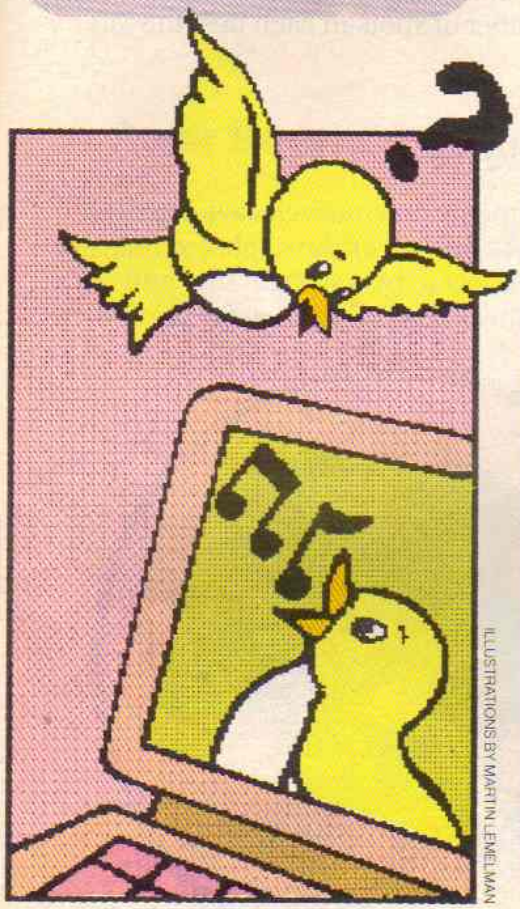


Batting Practice

Commodore 64/128

It's the middle of winter, and in most places it's too cold to be outside playing baseball. You can still get in a little batting practice, though, with this "Batting Practice" program. Run the program and a ball will be pitched from left to right on your screen. When it gets over the plate, swing your bat by pressing the letter "H" (for hit). **Dewey Spencer,** 13, of Ayer, Massachusetts hit a home run when he wrote this program.

```
90   FOR I=PM+512+Y TO
     PM+516+Y
100  READ A:POKE I,A
110  NEXT I
120  DATA 25,63,14,4,12
130  A=STICK(0)
140  IF A=15 THEN 130
150  IF A=11 THEN X=X-1:POKE
     53248,X
160  IF A=7 THEN X=X+1:POKE
     53248,X
170  IF A<>13 THEN 220
180  FOR I=6 TO 0 STEP -1
190  POKE PM+512+Y+I,
     PEEK(PM+511+Y+I)
200  NEXT I:Y=Y+1
210  IF A<>14 THEN 250
220  FOR I=0 TO 6
230  POKE PM+511+Y+I,
     PEEK(PM+512+Y+I)
240  NEXT I:Y=Y-1
250  POKE 755,1
260  POKE 712,150:POKE 710,150
270  POSITION 7,5
280  PRINT #6;"CANARY"
290  FOR ST=0 TO A
300  SOUND 0,ST,14,4
310  NEXT ST
320  SOUND 0,0,0,0
330  GOTO 130
```



ILLUSTRATIONS BY MARTIN LEMELMAN

```
10   REM BATTING PRACTICE
20   PRINT CHR$(147)
30   POKE 53280,2:POKE 53281,0
40   PRINT CHR$(5)
50   REM GAME LOOP
60   PRINT CHR$(147)
70   I=1739
80   FOR P=1 TO 3
90   POKE I,111:I=I+1
100  NEXT P
110  POKE 1621,78
120  REM PITCHING LOOP
130  I=1584
140  FOR P=1 TO 39
150  POKE I,81
160  FOR T=1 TO 90:NEXT T
170  POKE I,96:I=I+1
180  GET A$:IF A$<>"H"
     THEN 210
190  POKE 1621,77
200  IF I>1617 AND I<1622
     THEN 230
210  NEXT P
220  GOTO 400
230  B=1622-I
240  REM THE HITS
250  ON B GOTO 260,280,300,320
260  PRINT "POP FLY!!!"
270  Q=16:D=40:GOTO 340
280  PRINT "HOME RUN!!!"
290  Q=12:D=42:GOTO 340
300  PRINT "LINE DRIVE!!"
310  Q=5:D=47:GOTO 340
320  PRINT "GROUNDER!!!"
330  Q=4:D=50:GOTO 340
340  FOR P=1 TO Q
350  POKE I,81
360  FOR T=1 TO 50:NEXT T
370  POKE I,96:I=I-D
380  NEXT P
390  GOTO 410
400  PRINT "STRIKE!!!!"
410  FOR DE=1 TO 500:NEXT DE
420  GOTO 50
```

Send Us Your Programs

If you've written a program you'd like us to print, send it in. Include a note telling us your name, address, age, T-shirt size and type of computer. If we like it, we'll print it and send you $25.

All programs must be your own original work. We cannot return programs. Please do not send disks.

Send your program to:

Basic Training
3-2-1 CONTACT Magazine
1 Lincoln Plaza
New York, N.Y. 10023

Extra!

by Ellen R. Mednick

Welcome—Square One TV

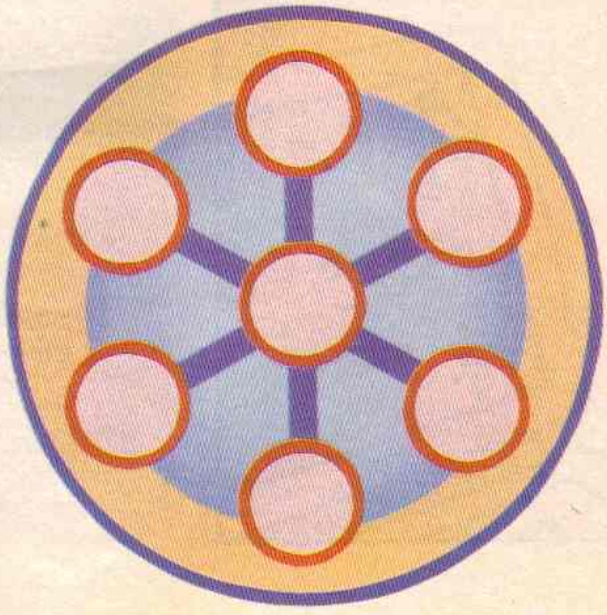
This month we're bringing you an extra special EXTRA! to introduce you to the new math show—Square One TV. It will be broadcast this month, beginning January 26, on your local PBS station.

Scrambled Eggs

Here's a bird that's really laid an egg—oops—eggs in three different nests! Each nest should have an equal number of eggs and spots. Can you switch *two* eggs to make the number of spots in each nest the same?

Math Roulette

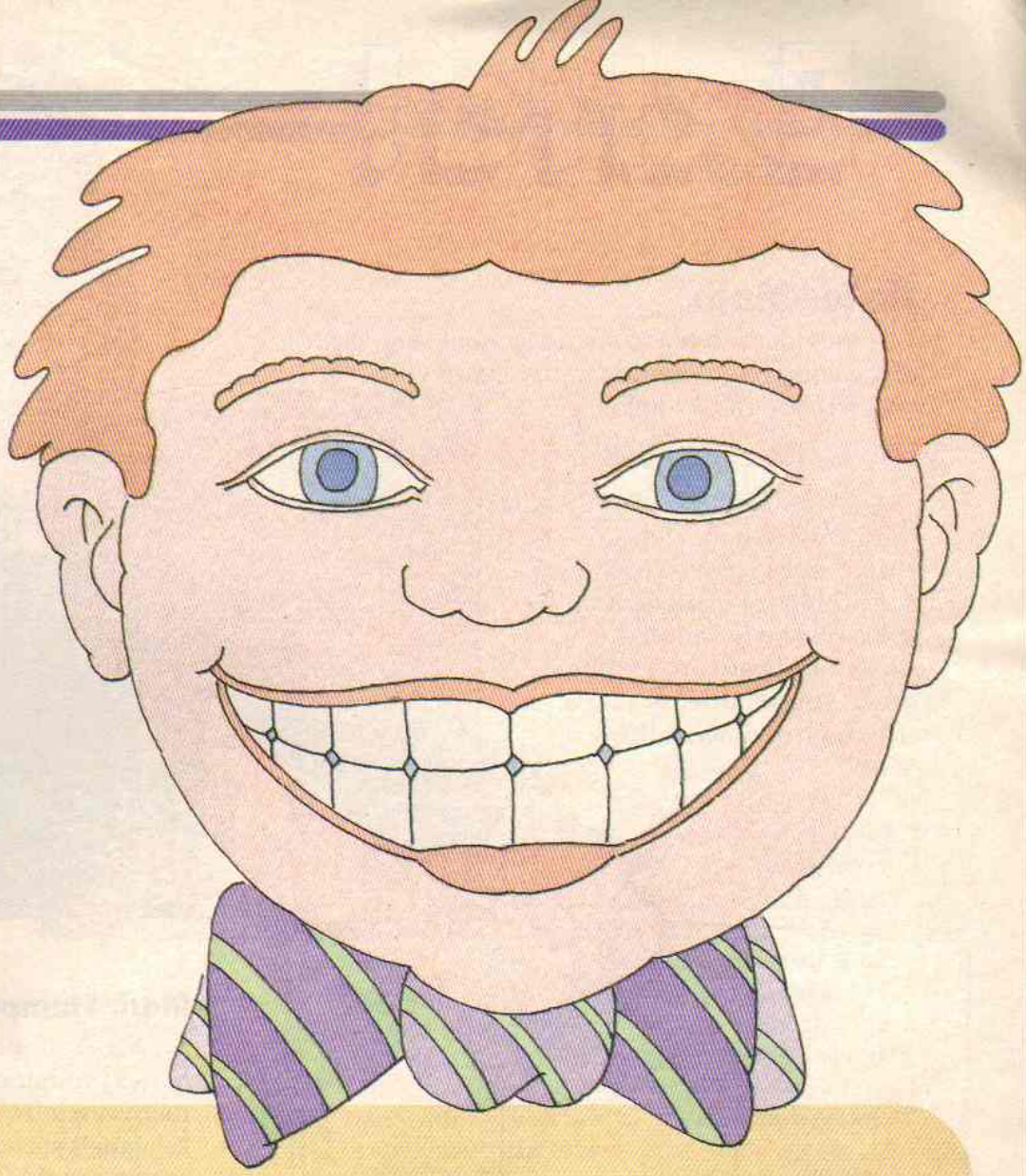
Using the numbers one through seven, write a different number in each of the circles so that any three circles connected by a straight line will add up to 12. Check the Did It! page for the answer.



Funny Face

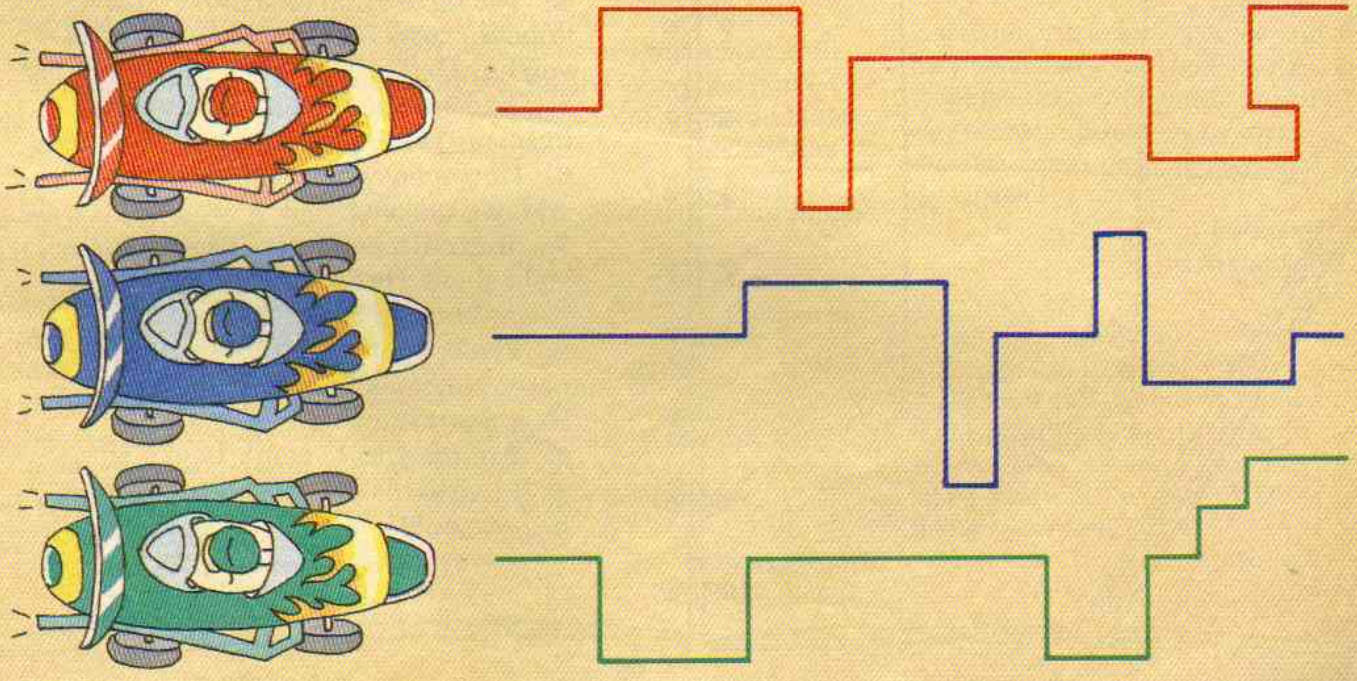
What's the magic number for a healthy mouth? 32! Teeth, that is. And they all add up to a winning smile. Why is this mouth smiling? We thought we'd ask you. Tell us in 50 words or less why this person is smiling. We'll choose our favorites. The winners will receive 3-2-1 CONTACT T-shirts.

Send entries to:
Contact Smiling Contest
P.O. Box 599
Ridgefield, NJ 07657



Ruler Race

Get set, get ready—to measure up! These three cars are about to begin an amazing race. The only hitch—the car that has the shortest distance to travel will win. Using a ruler, measure which car has the shortest route from start to finish. Check the Did It! page for the answer.



ILLUSTRATIONS BY MICHAEL DONATO

Extra!

Tic-Tac-Math

Here's a new twist to an old game. Fill in each of the squares on the tic-tac-toe board with one of the numbers below.

25 7 20 13 4 40 6 5 8

The numbers you just filled in are the answers to the questions on the stumper list below. As you solve the problems, mark an X on the correct answer on the tic-tac-toe board. You win when you get three X's, up, down or diagonally.

ILLUSTRATION BY MICHAEL DONATO

Math Stumpers

1. Sara's mom bought 12 cookies. Sara's brother gulped down four. How many are left?

2. Jane's soccer team has 12 players. Seven caught the flu. Ah-choo! How many are left?

3. How many legs do three pigs and two cows have?

4. You have $1.00 for a movie snack. Popcorn costs 75 cents. How much do you have left?

5. Add *3-2-1* and what do you get? Besides a great magazine and TV show!

6. How many cents is three dimes and two nickels?

7. Tom cut a pepperoni pizza into eight slices. He dropped four on the floor. Whoops! How many are left?

8. Zoe bought 12 hats for her birthday party. Nineteen friends showed up. How many more hats does she need?

9. Andrew has 15 comic books. He gave two to his friend. How many does he have now?

Mail

TV Talk In "Choosing Channels" (September 1986), we asked for your opinions about TV. We got lots and lots of letters back! They were all terrific, but we only have room to print a few of your comments. Here they are:

I think TV is fine but we also need time to be outdoors. If I were a parent, I would encourage my kids to be outdoors more.

Susan Rothfuss
Germantown, OH

I watch "Fat Albert" and I think it helps me to solve my problems. It's a good show, and it teaches right from wrong.

Mary Grady
Galveston, TX

Our TV broke down seven years ago and we've never replaced it. We've never really regretted not having a TV. The time most kids spend watching TV, we read books. We also spend more time together as a family.

Janell Hubley
Jeffers, MN

I'd prefer TV shows without commercials, but, knowing that without commercials there could be no TV shows at all, I don't mind them.

Karen Matsuoka
Los Angeles, CA

I went to England and watched TV there. They had a lot of kids' talk shows. They teach you all sorts of things, yet they are fun. They had shows that dealt with real-life situations and would tell you what to do if something like that happened to you.

Amy Callahan
Huntley, IL

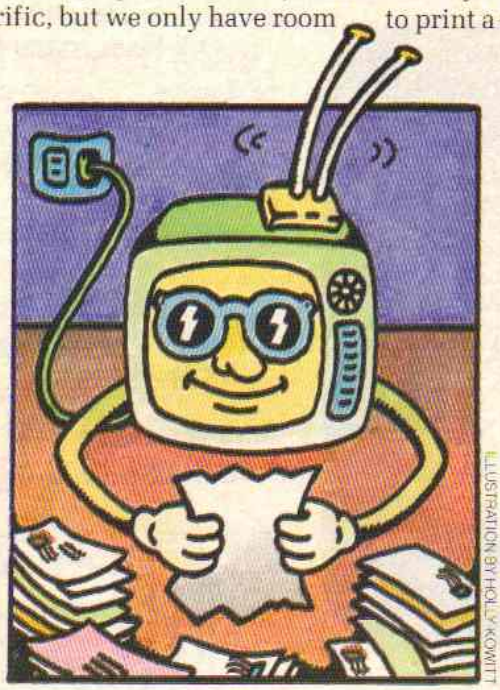


ILLUSTRATION BY HOLLY KOWITT

I have Transformers, Masters of the Universe and GI Joe toys and watch "The A-Team" on TV. I disagree that this stuff makes kids pick fights, since I never fight with other kids.

Jamie Brent
Knoxville, TN

I used to watch TV from the time I got home from school until nine at night. I found that it interfered with my homework and time with friends. Now I watch it from one to two hours a day. Anyway, the point is, don't let TV control your life.

Gina Hudson
Tampa, FL

I think TV is strange, but commercials are really bad. It's always the women doing the cooking and cleaning.

Raina Golden
Cincinnati, OH

I am very upset about your article on TV! Give me a break! It's not the TV that "encourages" you to eat—it's you! I exercise while I watch the "tube." My little brother loves watching good shows like "Sesame Street" and "Mister Rogers' Neighborhood," which you failed to mention.

Heather Lovett
Phoenix, AZ

The critics said things like "Go-Bots" and "He-Man" programs are like half-hour-long commercials. I have one of the biggest collections of Go-Bots in the state of North Carolina. The program has nothing to do with my hobby. I'm not saying that all people see it the same way. I know a person who watches "GI Joe" and he begs for the toys.

Anthony Mitchell
Zebalon, NC

In your article some people said they wish that some shows were more realistic. Well, I think that if I saw the same things on TV that I did every day in real life, it would get boring.

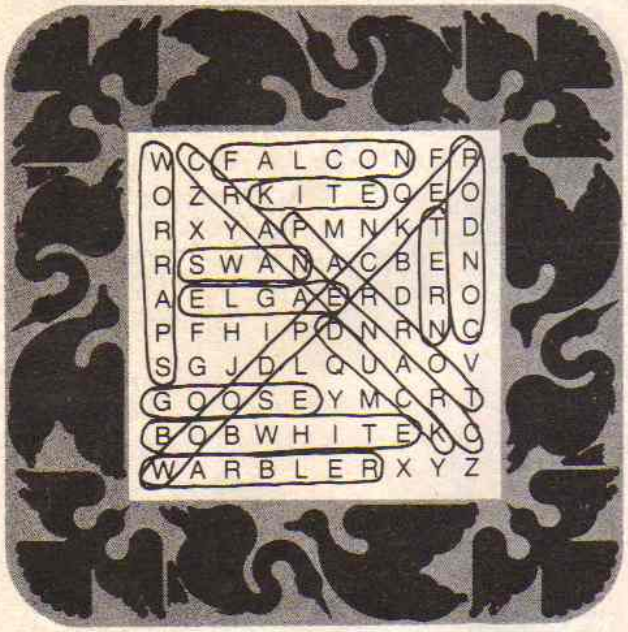
Jason Ivey
Orlando, FL

I think it's all right to watch two or three shows a day. It's better to watch shows without a lot of violence. Anyway, there are plenty of things to do without TV.

Jason Paulsmeyer
Chamois, MO

Did It!

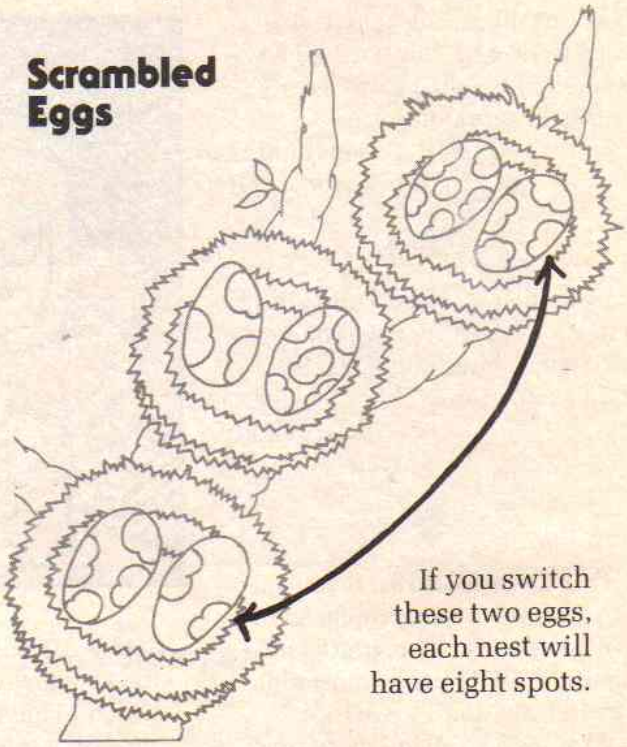
Word Hunt



A Snowy Scramble

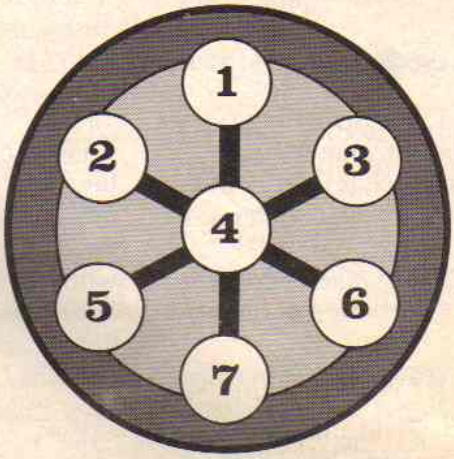
The snowman-maker is on the path that leads to the fireplace.

Scrambled Eggs



If you switch these two eggs, each nest will have eight spots.

Math Roulette



Ruler Race

The green car has the shortest route.

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Next Month!

Here's a sneak peek at what you'll discover next month in 3-2-1 CONTACT:

Amazing Mazes

Meet a person who designs life-size mazes for a living...and learn how you can find your way out of mazes fast!

Earthquake!

Discover how scientists are trying to predict earthquakes before they happen. You'll also find out what engineers are doing to make buildings earthquake-proof.

Future Poll Results

In September, we asked for your opinions about life in 2006. We'll tell you what kids all across the U.S. predicted.

Plus the Bloodhound Gang, and much more!